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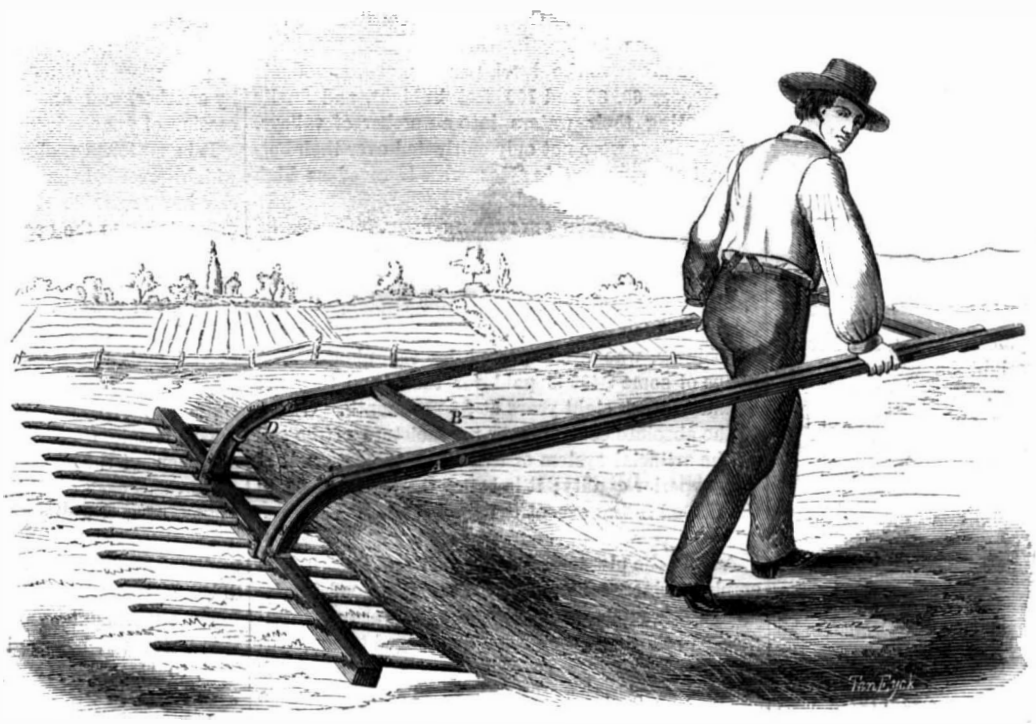
Mechanical Hand Rake.

The uses and importance of the horse hay-rake are so well known that we need not comment upon them. It would be difficult to find another tool which is so important or pays for itself so quickly. The rake here illustrated is similar in its construction to the horse rake, but is much lighter and narrower, being adapted to the strength of an ordinary man. It is intended to be used where horses cannot be, as on lawns, or when the team is required on other work.

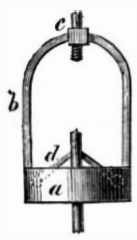
The principal novelty is in the mechanism for holding the rake in position and for detaching it when the load is to be thrown off. The details consist in a lever, A, joined to the frame, B, of the rake. The end of the lever is provided with a metallic guard which buts against a projection, C, screwed to the rake head. This device retains the rake in its position while in operation; a simple depression of the lever. A, being all that is needed to throw it out of contact with the rake head and allow the same to revolve. There are also springs, D, on the inner side of the frame which keep the rake teeth in contact with the ground.

This is a very useful and convenient utensil; for raking lawns, grounds or other places where it is undesirable to bring a horse, it will be found eligible. It was patented through the Scientific American Patent Agency on the 24th of Oct., 1864, by S. C. Rundlett, of Portland, Me. For further information address Rundlett & Johnson, proprietors, Portland, Me. E. Chapman, Jr., 229 Congress street, Portland, Me., is the agent for the same.



RUNDLETT'S MECHANICAL HAND RAKE.

TOOL FOR DRAWING BROKEN PUMP RODS.



We publish herewith an illustration of a very convenient little tool for drawing broken pump rods or drills for oil wells, which have slipped down out of reach. It is simply an iron ring, *a*, with a bail, *b*, on it, having a thread tapped in the square top, *c* There are two pawls, *d*, in the ring, jointed so that they move easily, and of such length that they will be about one-fourth of an inch less in diameter than the size of the broken rod. When this apparatus is let down the pawls slip over the rod, and when the whole apparatus is lifted by a rope or wire, the pawls bite on the broken drill or other object, and hold it firmly so that there is no escape. This tool is cheaply made and will be found serviceable.

Intensity of Action of Different Parts of the Solar Disk.

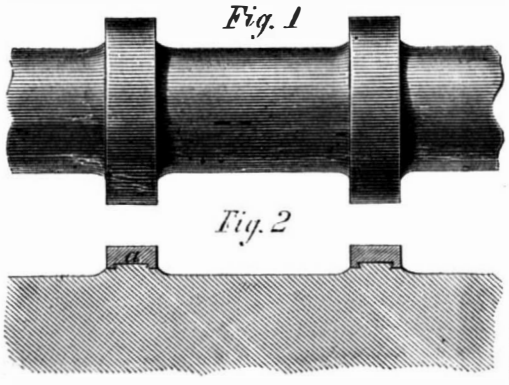
With regard to the late researches by Secchi—according to which the calorific radiation of the center of the solar disk is greater than that of the borders, nearly in the ration of 2 : 1, Mr. Volpicelli writes that the fact was very exactly observed in 1614 by Luc Valerio, a mathematician of Naples, author of a work, *De centro gravitatis solidorum*, and of another *De quadratura parabolæ per simplex falsum*. He was a professor in the Roman University, and has been called the Archimedes of his age

In one of his letters to Galileo, Luc Valerio considers the rays proceding from the central part of the solar disk as the more active.

Analogous facts have been observed by Mr. Roscoe, according to whom the center of the disk exerts a more intense chemical action than the borders. He has also observed that the south polar zone is more active than the north.—*Silliman's Journal.*

HOW TO SHRINK COLLARS ON A SHAFT.

In forging heavy shafts for marine engines or other work, the collars, where journals come, give a great deal of trouble. A very neat way of putting them on by shrinking is shown in the accompanying engravings, in which Fig. 1 is a front elevation, and Fig. 2 a profile in section. The shaft is left slightly large where the journals occur, and bosses turned for the collars to set on. On these the seats for the collars are turned. The collars are welded up separately, and bored and turned complete in the lathe, a recess being left for the rib on the shaft. This rib need not be more than three-sixteenths of an inch high in shafts twenty inches in diameter, being limited in size by the amount the collar will expand when heated. The lateral shrinkage left on the collar should not be more than the one-hundredth of an inch; a snug fit will answer, since the collar never can shift even if it becomes loose.



After the several parts of the shaft are finished the collars are heated and shipped over the end of it, but care must be taken to ascertain first, whether the collar has been expanded sufficiently, otherwise it will stick when half on. It must not be heated so hot as to raise scale, for that would destroy the fit of the several parts. For heavy shafts this will be found an expeditious method.

Defaced Treasury Notes.

The *United States Mail*, the official paper of the Post Office Department, says:—"Postmasters are obliged to receive all Treasury notes for stamps and postages, if clearly genuine, no matter how torn or defaced they may be, provided one-twentieth part thereof be not missing. Such notes and currency received as are unfit for re-issue should be kept separate and distinct, and returned as occasion requires to the Treasurer of the United States, Washington, in sums of not less than three dollars, to be exchanged for new."

Cement for Rooms.

An invention by M. Sorel, of Paris, is stated to be superior to plaster of Paris for coating the walls of rooms. It is used in the following manner:—A coat of oxide of zinc mixed with size made up like a wash, is first laid on the wall, ceiling, or wainscot, and over that a coat of chloride of zinc applied, being prepared in the same way as the first wash. The oxide and chloride effect an immediate combination, and form a kind of cement, smooth and polished as glass, and possessing the advantages of oil paint, without its disadvantages of smell.—*Dublin Med. Press*, Aug. 31, 1864.

How to Make Green Confectionery.

The *Druggists' Circular* informs a correspondent that a harmless green color for dyeing confectionery can be made by digesting five grains of genuine saffron in two drachms of distilled water for twenty-four hours; meanwhile, dissolve four grains of sulphate of indigo in half an ounce of distilled water, and mix the two solutions; the liquid will assume a beautiful green color. Three drachms of this are sufficient for dyeing intensely two pounds and a half of sugar. The green liquid, boiled with sugar and concentrated to the consistency of sirup, may be preserved for a long time.

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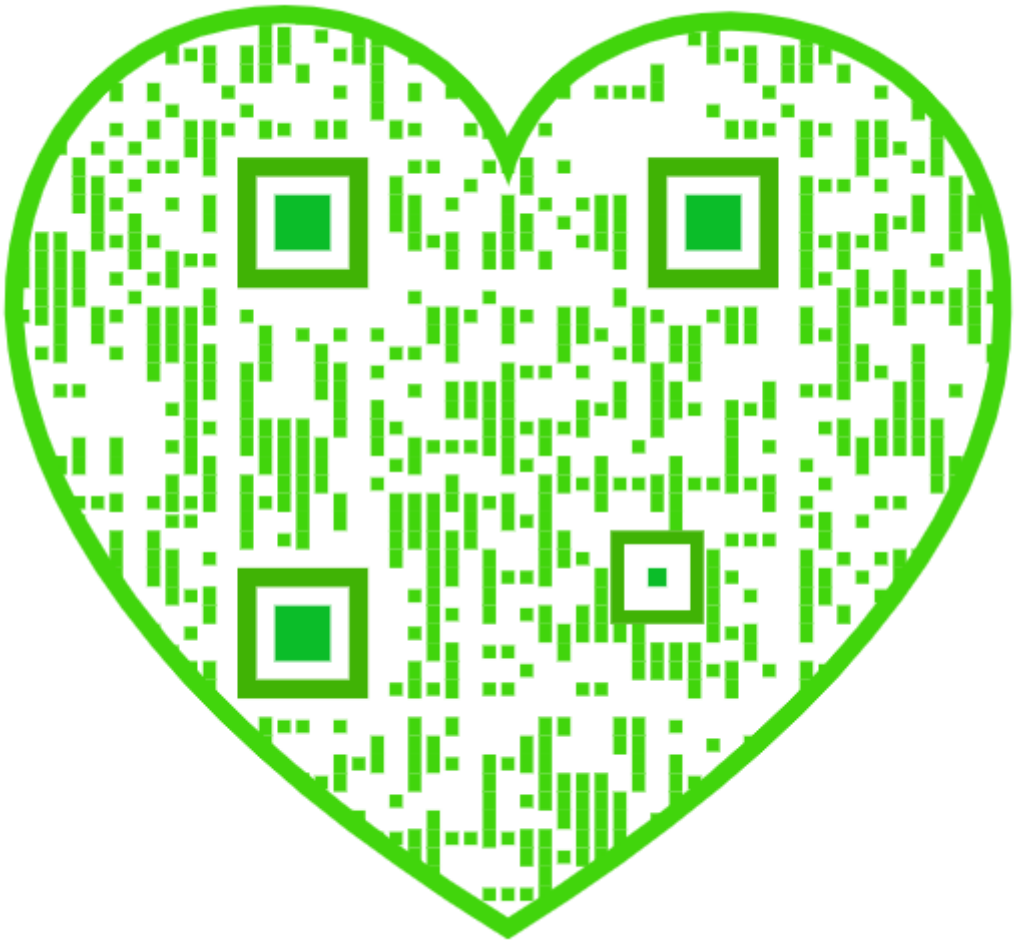

POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

The Association held its regular weekly meeting at its room at the Cooper Institute, on Thursday evening Jan. 12, 1865, the President, S. D. Tillman, Esq. in the chair.

THE METAL PALLADIUM.

Dr. Parmelee exhibited a coil of palladium wire weighing about four ounces, Troy, and valued at about $600. He states the sample was manufactured by Messieurs Desmoutes, Morin, & Chapuis, of Paris, and that the specimen is more interesting from the fact of its being chemically pure, while others are generally alloyed with from 40 to 60 per cent of silver. Its general characters are like those of platinum; but, while it is infusible in an ordinary wind furnace, it melts at a lower temperature than that metal. Its specific gravity is 11.5; atomic weight 53.24. It occurs chiefly in the ore of platinum, in the proportion of about one per cent; it is extracted by dissolving this ore in aqua regia, and precipitating the palladium from the solution by chloride of ammonium. After filtration the palladium is separated by cyanide of mercury, or cyanide of palladium. This is usually converted into a sulphide by heating it with sulphur; and afterward the sulphur is expelled by repeated washings. There are other processes of a more complicated character and probably less valuable. Palladium has been applied in a few cases to the construction of graduated scales of astronomical instruments. Porcelain manufacturers employ it in some instances to produce a fine silver gilt on ornamental wares. It is also used in bronzing brass for ornamental purposes. Photographers also employ the chloride to some extent for toning their pictures. The scarcity of the metal has limited the application of it to few uses. This wire is the $\frac{1}{38}$th of an inch in diameter, and is worth about $40 per foot.

Professor Seely remarked that a few years ago, at a meeting of the Photographical Society, Dr. Draper suggested that palladium might be used to advantage for toning photographs. When photographs are made the darks are silver, and the color of this metal is not pleasing to the eye; photographers therefore dip their pictures into a solution of gold, which gives them a beautiful purple color. Dr. Draper's suggestion attracted a good deal of attention, and palladium was probably inquired for at every place in the city where there was any reason for supposing that it might be found. There was none to be had, and the speaker applied to Dr. Draper, who said that a few years before there was plenty in the market at $10 per ounce. The supply had been exhausted by makers of gas fixtures and others, who used the metal for giving a beautiful bronze finish to their work.

Professor Everett stated that a few years since he obtained about four ounces of palladium from some platinum ore that he was analyzing, and he made it into a solution of chloride of palladium, to be used for bronzing. After selling three bottles it was discovered that the supply in the market was running short, and when we sold the first lot from the fourth bottle, my partner filled up the bottle with water. The solution seemed to work just as well till it became very weak, so that we got as much for the fourth bottle as we did for the other three.

Mr. Maddock stated that the bronzing of porcelain is now effected with a preparation of iron.

THREAD.

Dr. Rowell illustrated by a piece of tape that if a thread or other string is wound on a card with the right hand, holding the card in the left, a twist is put into the string at every revolution around the card; but if the card is shifted to the right hand and the winding continued with the left, the twists are taken out, or the thread is twisted in the opposite direction. The same action takes place in ordinary sewing by hand, a twist being either put into the thread or taken out at every stitch. It is for this reason that girls are taught to work button holes always in the same direction, going from left to right along the lower edge, and from right to left above when "twist" is used. The twisting is avoided in winding thread by adopting the method usually practiced by boys in winding their kite strings. To avoid kinking or spoiling the thread from the twisting in sewing, thread is cabled as it is called; that is, it is first spun into threads and then these are twisted together. In sewing on sewing machines, no twisting of the thread takes place, it is therefore not necessary to cable the cotton for this use.

SOME FACTS ABOUT PERU.

At the meeting of the Farmers' Club, on Tuesday afternoon, January 17, Mr. P. G. Squier gave an account of the ancient and modern agriculture of Peru. We select from his discourse a few of the most interesting items.

THE INCAS.

At the time of the discovery of America by Europeans, Peru was governed by the Incas, who were both priests and rulers, and they had established the most absolute despotism. The organization of society was a kind of socialism, without either poverty or wealth. On the birth of a male child a certain portion of land was assigned him, and this was increased when he reached the age of ten years, and still farther when he was married, amounting then, however, to little more than an acre. Only a small proportion of the country is arable land, and that can be cultivated only by means of artificial irrigation, as there is no rain. Under the Incas every foot of land susceptible of tillage was cultivated to the very highest degree. Canals were constructed two hundred miles in length, winding round mountain peaks to preserve the level, passing over aqueducts of masonry 60, 80 and 100 feet in hight, and finally distributing their waters into a number of valleys. These valleys were not only cultivated over their bottoms, but the mountain sides were terraced as high as the water could be led.

COTTON CULTURE IN PERU.

Within a few years the cotton culture in Peru has been greatly extended. It is carried on mostly by foreigners, generally English and Scotch, though there are a few Americans. The laborers are nearly all Chinese, who are imported by the planters. A bonus of some $400 is paid for them, and they are bound to work eight years at $8 per month. Owing to the absolute control over the moisture of the soil by the artificial system of irrigation, the cotton is of very superior quality; it is better than any raised in the United States except the Sea Island.

AGRICULTURAL IMPLEMENTS.

Among the planters, the English and Scotch who employ Chinese laborers use generally good implements, but among the natives the tools are very simple. On the coast the plow is employed to some extent, but it is a very rude implement. It is a stick of wood sharpened at the end, nothing more than a wooden wedge. It is drawn by a single ox, by means of traces attached to his horns, and he is guided by means of a cord which is passed through his nose. The plow is the same that is generally used in Europe. I have seen one just like it within ten miles of Paris. Even this plow is used in Peru only on the coast; the one implement with which the agriculture of Peru is almost wholly conducted is an iron adze, with a short handle, to be wielded with one hand.

CONDITION OF THE PEOPLE.

The mass of the people live in the most miserable and squalid condition. Their dwellings are made by piling up loosely a circle of stones some three or four feet high, and covering it with a roof of grass. Their cooking utensils consist generally of one earthen pot and three or four dried bones. Perhaps the whole furniture of the house might be worth three cents.

RIVERS LOST AND FOUND.

Some of the rivers that flow down from the mountains sink in the sand and utterly disappear. In some of the valleys the Incas had the sand excavated to the depth of several feet, so as to get within reach of the subterranean waters, and when ground was found sufficiently moist it was cultivated. The sand thrown out formed great ridges across the valley. The moist strips between these ridges are now the choice localities for the cultivation of the grape. Looking down the valley you see nothing but a succession of dry, barren ridges of sand, but if you climb to the top of one of these you look down upon a display of verdure unsurpassed on the face of the earth.

DRUNKENNESS.

The three principal crops of Peru are Indian corn, cotton and the sugar cane. The juice of the sugar cane in the United States and Cuba seldom yields more than six per cent of sugar, but in some of the valleys of Peru it yields more than fourteen per cent. A large portion of it is made into the intoxicating drink called *aguardiente*. This rum is drunk by all classes of the people, old and young, rich and poor, male and female, religious and irreligious, and at all times of the day and night. The general condition of the people of Peru may be said to be that of drunkenness.

DIFFICULTY OF COOKING.

Mr. Squier described a large lake in the mountains 12,500 feet above the level of the sea, the waters of which are some 20° warmer than the surrounding atmosphere. The warmth of the water so tempers the climate that Indian corn may be grown on the borders of the lake, but water boils at so low a temperature at this high altitude that it is difficult to cook any kind of food properly. It is customary, therefore, to soak corn several months before the attempt is made to cook it in the lukewarm boiling water of that altitude.

THE LAW OF SUCCESSIVE SPECIES.

Of the many thousand species of plants and animals that existed in the early geologic ages, not a single one remains. The patient study of that wonderful history, which has been engraven by the hand of the Creator in the everlasting rocks, revealed that one species of animals came forth, slowly developed to perfection, and then slowly decayed, to be followed by another, and another, and another, in long succession of generations of species.

It is curious to observe that the same great law which governed the creation of animal life through the immeasurable ages of the past, applies at the present day to the coming forth of those microscopic organisms, whose existence is so brief that the growth and decay of a whole species may be watched in the compass of a week.

Professor J. Nickles, writing from Nancy, France, to Silliman's Journal, gives this account of an experment recently made by Professor Montegazza at the University of Pavia.

Two female frogs were quickly killed, by the destruction of the spinal marrow, and placed in two glass vases each of which contained 115 cubic centigrams of well-water perfectly transparent and free from all foreign bodies. One of these vases was left in diffused light, the other was placed in a box which did not permit a single ray of light to reach it.

The experiment was continued seventeen months. It is necessary, before giving the results of this long trial, to state that every time that the two vases were compared, they remained exposed to the air for an hour or more, and that the air was renewed at each observation. Germs could, then, easily fall in; and yet the results were very different in the two cases.

The following are the observed results:

1. Two identical bodies exposed to free air may present very different phenomena of putrefaction, according as they are exposed to the influence of the light, or shut off from it.

2. The chemical and biological phenomena of the two forms of putrefaction are very different, that is, we have in each case some special chemical products, and some peculiar animal and vegetable productions.

3. In darkness, there was a marked tendency to the production of vegetable organisms and very simple infusoria; the frog that underwent putrefaction while shut off from the light produced only some Mucedines, Monads and Vibrios; while the other afforded a very complicated fauna—Bacteriums, Vibrois, Spirellas, Monads of different speeies, Amœbas, Kerones, Alysum, Enchelides, Trachelius—and, finally, Infusorians still undescribed, much resembling the Zoosperms of the Tritons.

4. The abundance and superior organization of the Infusoria depend much more upon the progress of the putrefaction than upon the amount of putrescible matter. The more simple species always appear first.

5. The production of species of Bacterium takes place many times during the course of a long putrefaction.

6, When the liquid presents a new fauna, the new species are from the outset represented by a number of individuals at once; from one day to the next, they are simultaneously produced.

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7. In the course of a long putrefaction, there are some generations which endure for some days; others exist for a much longer time.

8. Rapid changes in the chemical composition of a putrescible liquid are always, or nearly always, followed by new sets of animal and vegetable microscopic life.

9. When circumstances are little favorable to heterogeny in a very long putrefaction, there may be intervals of time of greater or less length, in which the liquid presents no organism. Whoever should content himself with observing at such a moment, might say that there had been no generation; while some days before, or some days after, there had been, or there would be, a very abundant production of vegetables, or of animals, or of both at once.

Erosion of Lead by Insects.

The *Chemical News* says:—A letter to the *Times*, signed "Y," states that the erosion of lead by certain species of insects is not generally known, and may be extremely mischievous. Not long ago it attracted the attention of the French Academy of Sciences, and several communications upon it have been published in their proceedings, the *Comptes Rendus*. In 1858 Marshal Vaillant exhibited to the Academy leaden bullets brought back from the Crimea, in some of which the larvæ of insects had excavated passages three or four millimeters in diameter; but nothing of the kind had been detected in the cartridges of the Russian army in the Crimea, and the insect which damaged the French cartridges appears to have been imported in the wood of the cases in which they were packed. The insects do not eat the lead, but simply bore it out. In 1833 Audouin exhibited to the Entomological Society of Paris sheet lead from the roof of a building, deeply grooved by insects. In 1844 Desmarest mentioned erosions of sheet lead by a species of Bostriche (*B. Capucina*), and illustrated the fact by cartridges from the arsenal at Turin. Mr. Westwood, the well-known British entomologist, has recorded observations on the perforation of lead by insects. M. Bouteille, curator of the Museum of Natural History at Grenoble, sent to the French Academy of Sciences from the collection under his charge specimens of cartridges gnawed by insects, which were found *in situ*, and the reports on the subject by Marshal Vaillant, de Quartrefages, and Milne Edwards, state the insect to be *Sirex gigas*, a large hymenopterous species, which, in the larva state, lives in the interior of old trees or pieces of wood, and which, after the completion of its metamorphosis, quits its retreat for the purpose of reproduction. Scheurer-Kestner, in 1861, communicated to the French Academy a notice of the erosion by an insect of the sheet lead of a new sulphuric acid chamber. The creature was caught in the act of escaping through the lead, having been imprisoned between it and a wooden support. But perhaps the most interesting and important case of insect erosion is that of stereotype metal, which was communicated in 1843 by M. du Boys to the Agricultural Society of Limoges.

Acclimation of Salmon in Australia.

Professor J. Nickles writes to *Silliman's Journal*:—Recent experiments carried forward by the Acclimation Society have shown that it is possible to transport to distant countries the eggs of fertile fishes. One of its members, Mr. Millet, having observed that melting ice diminished the pulsations of the young fish of the Salmonidæ and delayed the hatching of the eggs, took the idea that this method would serve for the transportation of eggs of the Salmonidæ to Australia and Tasmania. The plan has succeeded, in spite of damaged eggs; a very large number have arrived there in a healthy state, and have been deposited in the rivers. Starting from London on January 15th, 1864, the eggs arrived at Melbourne on April 5th, and at Hobart Town, (Tasmania,) on the 22d. Everything indicates success.

Similar attempts have been made in the French possessions in Algeria, the rivers of which are very barren of fish. Eggs of salmon and trout have been carried there from Huningue (Haut Rhin), where, as we have previously seen, are found the principal basins for pisciculture. In spite of the differences of climate, these eggs have arrived safely, and have hatched in the basins prepared for them; they already begin to people the rivers. It is a result of no moderate interest to see the salmon of the Rhine and the trout of the Vosges transported to Africa, Australia, and Tasmania, and living and becoming acclimated there.

How to Cook Snails.

Fried frogs are very nice eating. Snails are said to be fine also. We have no passion for snails, personally, but some investigators may have, and we therefore append a plan for cooking them:—

"The large brown snails gathered in gardens are very good eating, and by some persons are very much liked. A year or two ago the master of a French vessel obtained leave to gather them in the garden to take on board his vessel, and they were eaten by the whole ship's company; in return the master was good enough to gather, prepare, and serve the snails up for our family dinner party, which he joined, that he might be certain of the cooking being perfect. The instructions were to use only those snails whose shells were at the edges sufficiently hard to resist the nail without breaking; to be careful not to gather the snails from off either ivy, box, or other evergreen, as snails so feeding were deemed unwholesome; to put them in water with a handful of salt to spit, that is, to cause them to clean themselves; and to boil them gently, when they come out of their shells with ease. We were then to prepare the frying pan with a little lard and parsley, and to fry the snails delicately; they thus form a dish a poor man might feast on and a rich man enjoy. Bread crumbs might be added if liked, and the snails might be stewed, but the mode of cooking just given pleased our family best, and formed a dish we have often tried since we received the instructions from the master of the French merchant trader. Kept for a week or so and fed on oat meal, then fried in oil with vinegar, salt, and pepper, they are considered *bien delicats.—A. C., in Gardener's Chronicle.*

Correction from a Noon Mark.

MESSRS. EDITORS:—Persons who use a noon mark or transit instrument to obtain the time by the sun, are in need of a better table for correction than is found in most of our almanacs. I would call the attention of watchmakers, railroad men and others to the Methodist Almanac, published in your city, as containing the correcttion calculaed in solar time, and given in minutes and seconds for every day in the year. I hope that some of our other almanac publishers will make one step forward in this age of fast traveling, and in their future editions follow the example aforementioned.

The writer for several years made use of a sundial, by which the image of the sun, inverted, was thrown upon a wall fourteen feet distant. The edge of the image produced was so clear and distinct that I was enabled to read the time of the transit of the sun to within two seconds. With the aid of the Methodist Almanac I could regulate my clocks and watches to a greater nicety than they could who depended upon the "town clock." J. A. S., Watch Maker.

516 Callowhill, Philadelphia.

Waste of Ammunition.

How much ammunition is wasted in battle, and how many muskets in the hands of incompetent or cowardly men are actually useless, the following official report of the small arms picked up on the field of Gettysburg strikingly illustrates. The statement has been published before, but we give it again as one of the strongest arguments in favor of a change to breech-loading guns. With breech-loaders it would be impossible to get more than one charge at a time, and a man could tell at a glance whether his piece was discharged or not: Of the whole number received (twenty-seven thousand five hundred and and seventy-four) we found at least twenty-four thousand of these loaded; about one-half of these contained two loads each; one-fourth from three to ten loads each, and the balance one load each. In many of these guns from two to six balls have been found, with only one charge of powder. In some the balls have been found at the bottom of the bore, with the charge of powder on top of the ball. In some as many as six paper regulation caliber fifty-eight cartridges have been found, the cartridges having been put in the guns without being torn or broken. Twenty-three loads were found in one Springfield rifle-musket, each load in regular order. Twenty-two balls and sixty-two buckshot, with a corresponding quantity of powder, all mixed up together, were found in one percussion smooth-bore musket. In many of the smooth-bore guns, model 1842, of Rebel make, we have found a wad of loose paper between the powder and ball, and another wad of the same kind on the ball, the ball having been put into the gun naked. About six thousand of the arms were found loaded with Johnston & Dow's cartridges; many of these cartridges were about half way down in the barrels of the guns, and in many cases the ball end of the cartridges had been put into the gun first. These cartridges were found mostly in the Enfield rifle-musket.

The Preparation of Matches Free from Phosphorus.

Hierpe has published the following receipts for a composition for the heads of matches, and for an igniting surface. That of the matches is as under:

Chloride of potash	4 to 6 parts.
Bichromate of potash	2 parts.
Ferric oxide	2 parts.
Strong glue	3 parts.

The *Polytech. Centralblatt* gives these directions for making two new kinds of matches.

Oxide of iron may be replaced by oxide of lead or of manganese. The above preparation will not ignite on sandpaper, but requires a surface specially prepared for it, and the author employs the following on the boxes:—

Sulphide of antimony	20 parts.
Bichromate of potash	2 to 4 parts.
Oxide of iron, lead, or manganese	4 to 6 parts.
Glass powder	2 parts.
Strong glue or gum	2 to 3 parts.

Another composition is described by Dr. H. Poltzer. A solution of sulphate of copper is divided into two equal parts—one is supersaturated with ammonia, the other with hyposulphite of soda. The two solutions are now mixed, and the mixture is briskly stirred. A violet-colored powder now deposits, which is a compound, says the author, of hyposulphurous acid with oxide and suboxide of copper, soda, and ammonia. A mixture of this salt with chlorate of potash detonates when struck with a hammer, and when rubbed in a mortar ignites and burns like gunpowder, leaving a black residue.

The above salt the author proposes to use for matches. It is not soluble in water, and the mixture with chlorate of potash is not hygroscopic. The mixture may be made with moist chlorate and the gum solution, and can be safely dried at 50° C. or higher. It inflames when rubbed on a rough surface, and the temperature developed is sufficiently high to ignite sulphur on the stick.

The only difficulty the author finds is in making the mass coherent: when dried on the stick he found that it would crack and drop off when rubbed. A manufacturer will probably soon overcome this difficulty.

The proportions made use of were one part of the copper salt, and two parts of chlorate mixed in a sieve, and then made into a mass with solution of gum, together with a little glass powder. This mixture was applied to matches dipped in sulphur as usual.

Pomade Divine.

Take of beef marrow 3 lbs., put it into an earthen vessel and cover it with cold water; change the water daily for a few days, using rose-water the last day. Pour off and press out the water; add to the marrow four ounces of Styrax, Benzoin, and Ohio Turpentine, one ounce of Orris powder, half an ounce each of powdered cinnamon, cloves, and nutmeg. Set the vessel in hot water, and keep the water boiling for three hours; then strain.

TO CURE A "FELON."—As soon as the part begins to swell, get the tincture of lobelia, and wrap the part affected with cloth, saturate it thoroughly with the tincture, and the felon will soon "die"—poisoned instead of hung, as all *felons* ought to be. An old physician informs us that he has known this to cure in scores of cases, and it never fails if applied in season.

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Improved Flax Dresser.

This machine is intended to clean and dress tangled flax and render it free from the shoove or wooden coating in which it is cased, so as to fit it for working. Fig. 1 represents an end view of the machine and fig. 2 a side view. In the first figure a five armed apparatus, A, is shown attached to a disk, B. These arms have scutching blades, C, bolted on them in such a way that they can be adjusted at will to work close to, or farther from, the dressing board, D. This detail is shown in fig. 2, at E. The flax is laid on a trough, F, and fed to the scutching knives by the roller, G. This roller is set in a bell crank, H, which connects by means of a link, I, with the crank, J, below; a counterbalance on the shaft of this crank serves to regulate the pressure on the flax to be dressed, so that it is held firmly and yet fed regularly by the rollers until the scutching knives have removed the shoove. These knives work close to the dressing board, D, and are made self-adjusting by the springs at their backs so that no matter whether the mass to be dressed is thick or thin the office is properly performed. The disk, B, carrying the arms the scutching blades are on can also be set to dress a given amount of fiber. This is done by means of set screws and collars on the shaft the disk is secured to. There is also a screw stop at, *a*, which regulates the descent of the feed roller and prevents it from coming in contact with the dressing board. The woody portions driven off by the scutching blades fall through at the riddle, K, or sieve portion of the casing in which the arms revolve.

The combination of these several parts, it is asserted, produces an efficient and economical machine for the purpose. It was patented through the Scientific American Patent Office on Nov. 29, 1864. For further information address the patentee, William C. McBride, at Raritan, N. J.

Fig. 1

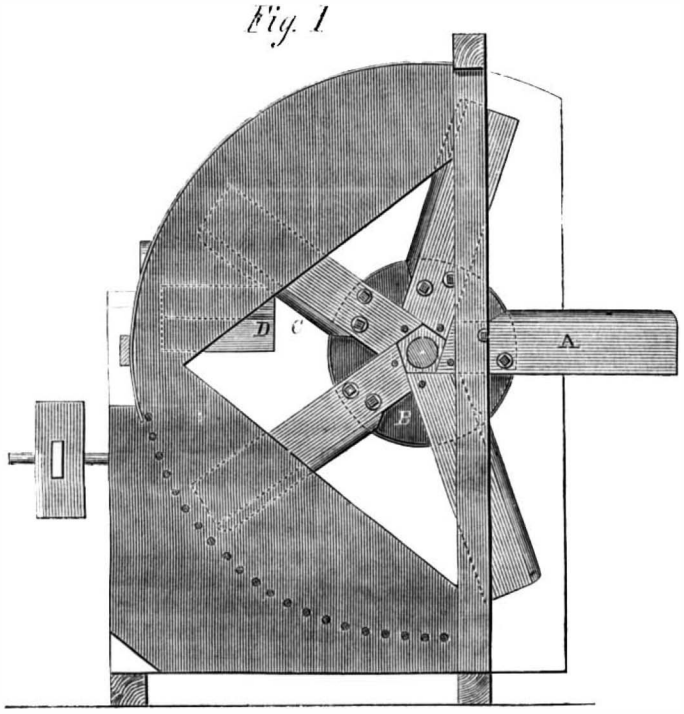
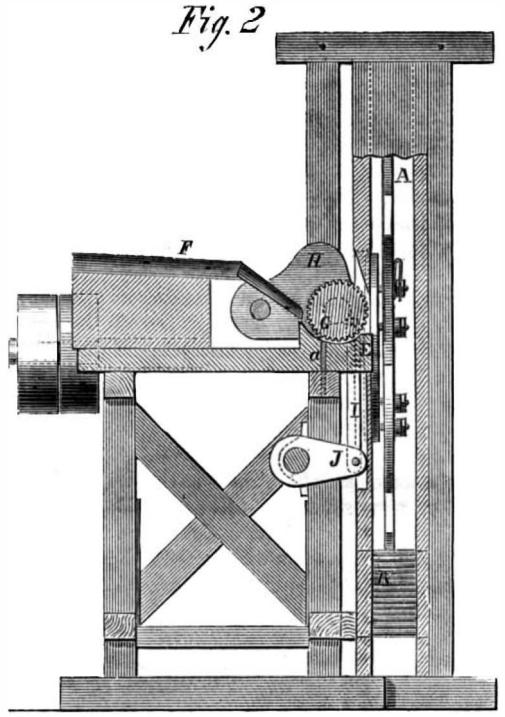


Fig. 2



M'BRIDE'S FLAX DRESSER.

THE METRIC SYSTEM.

When we commenced advocating the adoption of the French system of weights and measures, we were not aware that several co-laborers were zealously engaged in the same work. We have just received from H. E. Johnson, Esq., of Baltimore, Md., a circular published at the joint expense of himself and B. S. Dexter, of Tioga County, N. Y., urging upon Congress the legalization of the metric system.

From this circular we make the following extracts:—"The metric system is used not only in France and her colonies, but several other European nations have adopted it. It is legally established throughout Italy, with the exception of Rome and Venice. Two errors have been committed in Europe, which it is hoped will be rectified and never repeated. In one instance a decimal system has been adopted, founded on a metric system, but not identical with it, and in some instances the names have been, and perhaps still are, entirely unlike the French names. It can not be too firmly impressed upon the public mind that, in order to reap the full benefit of a universal decimal system, there should be, in effect, but one measure of length, one of area, one of capacity, and but one weight, and that the corresponding names in all languages should be nearly alike.

"How can this system be made universal? Every nation should make it the Government standard. The *gram* should be the postal weight throughout the world. Other nations and states should follow the example of Connecticut, and introduce the system into their schools. Let the steps taken be energetic and efficient, for while men buy and sell by different systems inconvenience will be experienced, but when the old system is abolished the inconvenience will cease.

"The long names of the French system constitute an objection which can be easily avoided. They can be abbreviated so that the units will be of one syllable, and the derivatives of two, and yet bearing sufficient resemblance to the French terms to be easily identified. *Metre*, *litre* and *are* should be *met*, *lit*, and *ar*. *Deka*, *hekto*, and *kilo*, should be *Dek*, *hek*, and *kil*. *Deci*, *centi*, and *milli*, should be *des*, *cen*, and *mil*. Then *hektometre* (100 meters), would be *hekmet*, *centimetre*, (1-100 meter), would be *cenmet*. *Hektolitre*, (100 liters), would be *heklit*, and *decilitre* (1-10 of a liter) would be *deslit*.

"As the metric system is entirely decimal no reduction is required, and there is substantially but one measure of length, the *met*, one of the area, the *ar*, one of capacity or cubic measure, the *lit*, and one weight, the *gram*. It is not necessary to point out the irregularities and inconveniences of our present system. How many of the readers of this article can recite our tables of weights and measures without making several mistakes? How many can tell, without calculating, how many feet are in a mile, or how many cubic inches in a gallon?

"It requires but little study to understand the meaning of the terms, *met*, *ar*, *lit* and *gram* and but little mental exertion to remember that *dek*, *hek*, *kil*, indicate respectively 10, 100, 1,000, and *des*, *cen*, and *mil*, 1-10, 1-100, and 1-1000. When these simple facts are learned the metric system is, for all practical purposes, mastered."

If there is any one in this city who takes sufficient interest in the reform to circulate petitions to Congress, Mr. Johnson would like to hear from him.

REAL AND IDEAL—Is the title of a volume of poems dedicated to Prof. Longfellow, by John W. Montclair. There are several meritorious translations from Heine and other German poets; also some excellent original productions by the author. The book is published by Frederick Leypoldt, of Philadelphia, and is sold by Hurd & Houghton, of New York city.

Tar Making in New Hampshire.

From Effingham, along the northeastern shore of Ossipee Lake (or the Great Pond, as it is locally called), and stretching away toward Conway, there are thousands of acres of pine plains, the timber on some portions having been cut. It is from the roots or stumps that the tar is extracted by a company locally organized for the purpose. The largest timber of these "cut downs" has been cut long enough to have all the sap-wood rotted away, leaving nothing but the clear wood. The Rochester *Courier* says, speaking of a spot near the village of Freedom:

"Here they set their stump-pullers at work, pulling from fifty to one hundred stumps each, daily, according to the difficulties encountered. These stumps are hauled to Freedom village, where they are cut and split into pieces about the size of very fine stove wood, and placed in what is called a basket. The basket is a wrought iron cylinder, punched full of holes of about three-fourths of an inch in diameter, and holding half a cord. This basket is taken by a crane and placed in a retort made to receive it. A round top cast-iron cover is then fitted on tight, with a pipe from the center, which connects with a coil of pipe in a condenser.

"The gas and steam passing off from the top of the retort, and through the condenser, comes forth from a barrel in the shape of an acid (which is worth ten cents a gallon among the calico printers, but is here thrown away,) and a red oil. The red oil is then passed through a still, and gives about half its bulk in spirits of turpentine. The other half is thin tar, which is mixed with that which comes from the retort. From the bottom of the retort the pitch which is 'tried out,' of the pitch wood by the heat applied to it, comes forth in the shape of thick tar. There are eight or ten retorts, which bring forth forty barrels of tar a week, and seven or eight barrels of spirits of turpentine.

"A cord of pitch wood gives about three barrels of tar and eighteen gallons of spirits, besides twice that amount of acid. The company have stumps enough dug to keep the factory running until until they can dig again in the spring; and it is said that there are stumps enough left on the plains to last the company for three or four years. The tar is worth about $14 per barrel and the turpentine about $250. Who but Yankees would have brought down the price of tar and turpentine by digging pitch wood stumps for its manufacture?"

TO PETRIFY WOODEN OBJECTS.—Take equal quantities of gem-salt, rock-alum, white vinegar, chalk, and pebbles powdered. Mix all these ingredients; there will happen an ebullition. If, after it has ceased, you throw some wooden objects into this liquid, and leave them soaking for four or five days, they will be transformed into petrifactions.

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TURNING TOOLS.

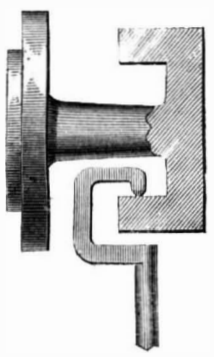
PART FIFTH.

Very many mechanics start the carriage with feed down the lathe shears, and, as the curve falls in on the rod, screw the tool in, thus gradually working out the curve. This may be a good plan where the curve is large, but as it changes its character near the neck of the rod, and becomes concave, instead of convex, the handle must move over a long space very quickly, and it requires good guessing to tell just how much or how little the tool will take. Sometimes it misses entirely or else takes a huge bite, and the latheman trembles lest the next thing his eyes behold will be the six-tun rod flying from its centers and crashing into the bed below, while the general wreck of face plates, cone pulleys, etc., carried down by his mismanagement, tell a piteous tale of want of system and good workmanship.

It is not seldom that similar cases occur. We once saw an impatient turner cutting a screw; when he came to throw the backing belt on to the pulley he slammed the shipping bar with such violence as to spread the counter-shaft hangers overhead apart, and the shaft, belting, pulleys, and all, came thundering down within an inch of his head.

The ingenious turner can readily contrive tools for special purposes, so that by them his work will be greatly expedited. It sometimes occurs that jobs have to be turned inside and out at one time or without removal from the face plate or mandrel; ordinary tools are then inapplicable. Such an instance is shown below, where the casting has to be turned off inside and out without removal. As the inside cannot be bored with a boring tool (it being next the face plate), a special tool must be used, and one is shown in Fig. 24, in connection with the casting

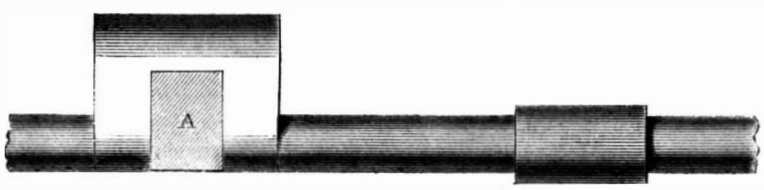
Fig. 24.



It must be borne in mind that we distinctly repudiate the use of such tools unless they are absolutely indispensable. The situation, however, is one that the turner has nothing to do with, and he must not be held responsible for want of good judgment on the part of the designer who contrived such an awkward piece of work. Such a tool as the one shown in Fig. 24, springs and buckles because it has no direct support or bearing from the shank, and cannot be used at all with a heavy cut.

In the manipulation of heavy crank shafts much care and good judgment is requisite. Crank shafts for inside connected locomotives and screw engines are made in one mass, and it is a costly piece of work to finish them. For large marine engines, crank shafts of many tuns in weight are sometimes built up or made in separate pieces and shrunk together. By this method they are not only as good as solid shafts, but better, for in the crank and pin the fibers of the

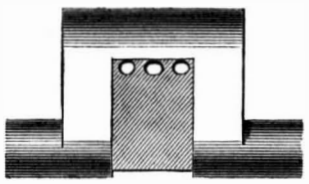
Fig. 25.



iron run in the direction of the greatest strain. The case is quite different in solid forged cranks. When properly shrunk together the parts are immovable by any ordinary power. The *Golden Gate*, of the Pacific Mail Steamship Company's line, has a composite center shaft of this kind, which weighs over twenty-five tuns.

To return to the solid crank shaft (Fig, 25). It is customary to cut the center piece, A, out at the slotting machine, but this is sometimes impracticable, owing to the size of it, or other causes. It is also drilled out, but these several operations involve more labor than when done in a lathe. The block is first cut out by drilling holes along the line of the crank pin, as in this diagram, and then running a square-

Fig. 26.



tool up to the holes. By this plan much handling of the shaft is prevented, for when the block almost drops out, the turner can detach it with a hammer and chisel and then go on and finish the pin up, without the trouble of taking out or putting it on the lathe so often. When the shaft is long it is a very troublesome piece of work to handle. There are strong cast-iron heads keyed on to the ends of the shaft,in which are centers to turn the pin on, balance weights must be put on the face plate of the lathe to compensate for the weight of the cranks. For want of these balances the work is very often spoiled. The crank being the heaviest has a tendency to fall forward immediately after passing over the top center. The back-lash of the back gear, which is always in, allows it considerable motion, so that a very little is enough to make it mount on the tool and break it off or else cut into the surface of the pin and destroy its truth. All the centers must be well screwed up, and the lathe centers, especially, have a fair bearing, or else they will work out of correctness and make the crank pins and journals oval instead of round.

When the square-nosed tool is run in it must have a narrow steel shore under it, so fitted, in a slight depression on the lower side of the tool, that it can not fall out when the tool springs, as it does after every cut; very many turners make the tool with a deep belly, so that it is strongest in the direction of the cut.

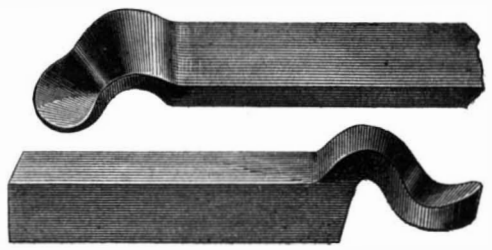
As the tool advances the shore advances with it, and the bottom of it rests in a shallow groove at the foot of the tool post. The tool should not have a lip on it, nor much rake, and the shaft must run slow and steadily. The feed must also be regular and even, and with these precautions, there is little or no danger of jumping it into the work.

Another very difficult tool to manage is the common straight cutting-off tool. There is no reason why this should be so, but it is a fact and will be universally acknowledged by machinists. The trouble arises from a want of care in making the tool. It merely requires to be straight from its cutting edge and sides down, not glanced or rounded off.

It is almost impossible to indicate in an engraving the slight amount of end roundness which will spoil the action of the cutting-off tool. If the corners of the sides are rounded over, even slightly, the tool is in danger of catching and breaking off, while, if the front or cutting edge be also an indirect line, it is liable to be drawn down instead of taking a direct hold on the work.

On page 35 of this volume, and in connection with this subject, we gave an illustration of a straight finishing spring tool, and specified some of the uses cutters of this class were applicable to. They come in play in putting the final touches on the crank pin, for here the tool has to be extended a long distance from the support, and a common solid tool is in danger of springing and forcing the edge in. The spring partition must be made light enough to yield when a heavy strain comes on the edge, and yet sufficiently strong to carry a moderate feed without causing the surface to be irregular. The round corners are apt to be full of chatters when the solid or stiff tool is used, but with this tool the fillets will be, when used in connection with water, of the most beautiful character that it is possible to imagine. In these figures,

Fig. 27.



27, an illustration of a round-nosed filleting tool is given, which works well and gives good satisfaction when properly used.

Production of the Sexes.

What are the causes of the production of the sexes? This question, which has occupied the earnest attention of physiologists, has been thoroughly studied by Mr. Thury, according to whom the product is always of the male sex when the fertilization of the ova occurs at complete maturity, and is always female when it takes place at a less advanced period.

There is a very simple way of solving this problem. It is to select for experiment species that come to maturity in succession, and, that during a single impregnation, fertilize the whole series of ova which detach themselves from the ovary during a period of eight, ten, twelve, fifteen, or even eighteen days. We know, indeed, that, in the case of the hen, a single coupling suffices for the fertilization of five, six, or even seven eggs which she is about to lay and which are arranged in her ovary in the order of their maturation. Now, in such a case, if the theory is exact, the first egg laid ought always to produce males and the others females without any possibility of the inversion of this order.

This is very near what has been observed by Messrs. Coste and Gerbe:

A hen, separated from the cock at the time of her first laying this year, gave five fertile eggs in the space of eight days.

The egg laid on March 15th produced a male; that on March 17th a male; that on the 18th a female; that on the 20th a male; that on the 22d a female.

A characteristic fact in this experiment is the production of a male after a female, which ought not to have taken place according to the theory. But is it only a simple exception? Or is it necessary to consider the fact a radical objection? We may learn by and by on this point, from the researches in which Mr. Gerbe is now engaged.

On the occasion of the preceding note, Flourens recalled an experiment which he made, thirty years ago.

"Aristotle had observed that the pigeon ordinarily lays two eggs, and that of these two eggs one commonly produces a male and the other a female. He wished to know which was the egg that gave the male, and which the one that produced the female. He found that the first egg always gave the male, and the second the female. I have repeated this experiment as many as eleven times in succession, and eleven times in succession the first egg gave the male and the second egg the female. I have seen again that which Aristotle saw."—*Silliman's Journal.*

The Phrenological Journal.

This able publication continues to be the only periodical now printed, either in this or any other country, whose pages are wholly devoted to the consideration and study of physiology, phrenology, physiognomy, and all the latest ologys. These, at first blush, seem to be dry subjects. But a perusal of a single number of the *Phrenological Journal* will show that the theme of the Mind, and its various physiological indications are among the most comprehensive and deeply interesting things to which attention can be given. No person can be said to be well informed, much less, educated, who is unacquainted with the principles of mental philosophy as revealed from the stand point of modern Phrenology. S. R. Wells, Editor. Monthly, illustrated $1·50 a year. 389 Broadway.

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EDITORIAL CORRESPONDENCE.

WASHINGTON, Jan. 17, 1865.

Washington presents all the life and animation that usually mark the period immediately succeeding the holidays. All the hotels and boarding-houses are filled to overflowing, and private residences are very difficult to be obtained. Since the passage of the act of Congress authorizing the enlargement of the Capitol and Treasury buildings, which indicates a permanent retention of this spot as the Federal Capital, real estate has greatly advanced in price; fine dwellings have rapidly increased; rents are very high, and many improvements have been introduced, prominent among which are the extensive water works and the net work of horse railways now completed and in progress. These add much to the convenience of the people in this "city of magnificent distances," and, thus far, greatly benefit those who have secured charters for the roads, which are admirably built and furnished, and, so far as I could judge, are well managed.

What a wonderful improvement on the old omnibus system, which is rapidly becoming obsolete, are these tramways on city thoroughfares. Omnibuses can neither compete with the rail cars nor can they accommodate the increasing demands of city travel, and the ignorant prejudice against tramways is dying out in proportion as the people experience their great benefits.

Since my last visit to Washington a marked change for the better is quite apparent. Then the streets were thronged with soldiers, horses, mules, cattle, army wagons, and other appendages of military operations, while the hotels were overrun with the shoulder-strap gentry, and, I must say, often to the discredit of the service, and much to the annoyance of the guests. The city was also a beleaguered city; the rebel hosts with their defiant banners, were hugging closely its outer ramparts, causing, meanwhile, most manifest uneasiness on the part of the residents, which those who were far away, in snug and safe quarters, could not appreciate. Many of the Departments were barricaded, and the employees generally armed to assist in repelling a threatened attack. Thanks to Gen. Grant and his brave troops, the scene is changed—Washington has nearly returned to its normal repose: a few sentinels pace their weary rounds; mounted guardsmen to patrol the streets are well nigh dispensed with, and in all the Departments there is the bustle of active and almost unceasing official duty.

THE PRESIDENT AND INVENTORS.

The first reception for the season of the Chief Magistrate was perhaps the most brilliantly thronged of any that I have ever before attended. Members of the Cabinet, Judges, Senators, Foreign Ministers and attaches, officers, soldiers and citizens, were there to pay respect to the Executive head of the nation. These great gatherings evince, perhaps, what was proved at the ballot box—the general popularity of the President—for, irrespective of any mere partisan idea, which is unworthy of being cherished as a ground of personal disrespect, I could not fail to regard with gratification the general good feeling which was manifested toward his person, despite a homely and somewhat awkward figure, the effect of which is greatly lessened by personal contact. He seemed not to tire of the constant hand-shaking, which is the citizen's prerogative on such occasions, but maintained a constant flow of genial mirth, an element in his nature which has lightened very much the heavy weight of care that rests upon him as President of the Republic.

I was much pleased to learn that in the midst of the many cares that press upon the President he is not indifferent to the claims of our inventors. Himself an inventor and patentee, he readily discerns the intrinsic value of all good inventions, not only to the public service, but also in their application to the industrial arts generally, and he will do all in his power to encourage and to promote the progress of these arts, by sanctioning all wise legislation in behalf of inventors.

The reception of Speaker Colfax, who is really one of the most genial and popular men in Washington, was attended by many of the most eminent men in the nation.

THE PATENT OFFICE.

My first interest very naturally centered in the Patent Office. Here I found Mr. Holloway and his efficient Chief Clerk, Mr. Hays, aided by a well-chosen and intelligent Board of Examiners and clerks, prompt and laborious in the discharge of their duties. I think I am warranted in saying that, on the whole, the Patent Office was never better conducted than now. I learn from inquiry in the office, and the records establish the fact, that the applications made through the Scientific American Patent Agency amount to nearly one-half of the whole that are presented, and the uniform testimony of the Examiners is, that the cases of no other agency are more carefully prepared. This certainly speaks well of the experience and admirable efficiency of the most extensive patent agency in the world. The influence of the SCIENTIFIC AMERICAN has done vastly more than any other agent in promoting the ingenuity of our people, and in building up the Patent Office to its present gigantic proportion. This fact is now thoroughly recognized in the office, and very naturally exerts its proper influence upon all officers of the Department. They regard this journal as the active supporter and ally of the office.

The Patent-Office building is now complete, and workmen are busy in fitting up cabinets in the large hall of the north front for the reception of models. Three other immense halls are now entirely devoted to this purpose, the average length of each being about 275 feet by 70 feet in width. A few years hence these all will be filled with the trophies of American ingenuity, and what will then be done with them is a question which even now begins to force itself upon the mind. Either a new building will have to be erected for their reception, or the law must be so amended as to entirely dispense with models. The amount of money and of patient labor invested in these miniature machines is almost incredible. The large hall over the main entrance to the Patent Office—once occupied as a national gallery or museum—is now the center of much interest, and is called the "Salle des Beaux Arts," or hall of fine arts. The decorations are novel, fanciful, and, in some respects, beautiful. Here is the only instance in this country, I believe, where the art of polychromy has been elaborately applied to the interior decorations of a public edifice. Hittorf, a celebrated traveler and explorer, published many years ago the result of his discoveries in this art as it was applied to the adorning of ancient monuments and architecture in Greece and Sicily, and since that time men of truly artistic taste have searched diligently for corroborative proofs of the facts asserted in his writings, and considerable has been done in Europe to make this art subservient to the interior decorations of public buildings.

The ceilings and pilasters of the new hall of fine arts are very chaste and beautiful, certainly as fine as anything of the kind I have before seen. The immense stone columns that support the barrel arches of the hall are painted in deep ultramarine, while the pedestals upon which they stand are painted black, relieved by white lines. Considerable unfriendly criticism has been bestowed upon these heavy blue columns, yet in the face of all such censure, and after a careful study of the effect produced in the wonderful blending of other colors, such as red, yellow and green, I think the conception, on the whole, is truly artistic. The black and white striped pedestals are in the worst possible taste, and ought to be redecorated at once. They look like big tea chests, and create the impression that they are doing their best to support a very heavy weight. Some will judge that these decorations were suggested by the arts of painting as practised by North American Indians, while others, and I think the larger portion, will regard them as the results of a truly cultivated taste.

Workmen are now engaged in this hall of fine arts in putting up handsome walnut cabinets, and it is the design of Commissioner Holloway, out of the surplus funds of the Patent Office, to introduce, as in the Conservatory of Arts in Paris, models of machinery and tools illustrating all the principal industrial arts of the country, as glass-making, sugar-refining, etc. The idea is a magnificent one, and, if carried out with good judgment and skill, the hall will become a point of the greatest interest and instruction to visitors. I wish that New Yorkers could be stirred up to establish just such a museum in the Central Park; it would be wonderfully attractive.

PATENT EXTENSION CASES.

Not much is doing at the present session of Congress in reference to Patents or the Patent Laws. In the House Committee on Patents, of which the Hon. Thos. A. Jenckes, of Rhode Island, who is well known to the readers of the SCIENTIFIC AMERICAN as one of the ablest patent lawyers of the country, is chairman, several extension cases are now pending its action, prominent among which are the Goodyear India-rubber patents which expire in June next; McCormick's Reaper; Fitzgerald's Fire-proof Safes, and others of less note. As the session will be a short one, and there is an immense press of public business, it is doubtful whether Congress will be able to consider all the cases before the Committee. The Goodyear case is receiving most attention, and may be brought forward. The heirs of Goodyear, who are said to be really quite poor, have, as I understand, modified their petition, and instead of asking an extension of the patents by act of Congress—a species of legislation which the SCIENTIFIC AMERICAN has always opposed—now apply for a bill to refer the case to the Commissioner of Patents, with power to hear testimony, as in all other cases of extension under the general law, and to decide it judicially upon law and evidence. This course is far preferable to the custom of besieging Congress to act directly in such cases.

PATENT LAW AMENDMENTS.

There is also pending before the Senate and House Committees a bill to amend the act of March, 1863, which requires the balance of the patent fee of $20 to be paid within six months after date of allowance, in default of which the invention becomes public, *as against the applicant only*. Under this stringent law many meritorious inventors—among whom are soldiers in the army on active duty—actually lose their patents; besides, the office suffers many inconveniences, and loses much revenue. The Commissioner of Patents warmly indorses the amendment, and I had the honor to present its merits to both Committees—the House and Senate. The relief, if granted at this session, will affect all cases now before the office, of which there are thousands. There is not a particle of opposition to the measure. Senators Cowan, Ramsey and Lane, also Mr. Jenckes, have all expressed themselves favorable to the proposed bill, and I have no doubt it will pass at this session. Applicants for patents whose interests are thus placed in jeopardy, ought to write to their Members of Congress, urging them to help the bill along

NATIONAL CURRENCY BUREAU.

During my visit I have been permitted to examine all the nice operations connected with the manufacture of ordnance and ammunition at the Washington Navy Yard, descriptions of which I do not feel at liberty to give. I was also permitted by Secretary Fessenden to visit the currency bureau of the Treasury Department. Persons are not allowed to visit this bureau for purposes of mere curiosity; therefore few passes are granted. As a matter of scientific interest I was honored with a pass, and witnessed every operation connected with the preparation of our issues of Government bonds and currency. I will not undertake to describe how five-twenties, ten-forties, greenbacks and the fractional currency are so beautifully and satisfactorily produced. This is quite well done on page No. 114, last volume, SCIENTIFIC AMERICAN, to which the reader is referred.

Upon entering the bronzing room I was greeted by Mr. Dunn, one of our former patrons. He has invented a very ingenious and beautiful machine for bronzing the currency; or, as some one has said, "to give it a metallic ring." It is, I believe, the only good machine for the purpose. There are also some ingenious machines for cutting the sheets of currency into parts and counting the exact numbers cut. Some recently-improved machines cut both ways at the same operation.

The question of dry printing by hydrostatic pressure, to which reference is made on page No. 294 of our last volume, is practically settled. Some eighty of these presses are printing fractional currency, and it is done more rapidly, I think, than by the process of wet printing. There is less manipulation required, while the work is finished in a superior manner. The dry process is gaining favor rapidly.

In the absence of Mr. S. M. Clark, the superintendent, I was shown through the bureau by Mr. E. H. Dougherty, his efficient assistant. Hundreds of

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men and women are here employed, and many millions of bonds and currency have passed through their hands, thus far without the loss of a dollar. There were at the time of my visit upward of one hundred and thirty millions of dollars in the iron vaults. * * *

PROFESSOR PAGE THE INVENTOR OF THE RUHMKORFF COIL.

[For the Scientific American.

In the SCIENTIFIC AMERICAN of Jan. 2d, 1865, you have described the Ruhmkorff coil to consist of the following parts:—a primary coil of insulated wire surrounding an electro-magnetic case consisting of a bundle of wires of soft iron, a secondary coil of fine wire of great length and carefully insulated, surrounding the primary coil, and a vibrating hammer or automatic circuit breaker. On connecting a small galvanic battery with the primary coil, the hammer is immediately set in motion, and the rapid breaking of the circuit caused by its motions produces currents of high intensity, and some of the brilliant appearances of statical or frictional electricity. It might have been added that Fizeau suggested the use of a peculiar condenser with the Ruhmkorff coil by which its electrostatic properties were displayed with great splendor. Having been informed that the instrument thus described as Ruhmkorff's was the invention of Prof. Page of Washington, I have taken some pains to inquire into the facts, and find that the entire instrument was made by him in 1838. The following facts appear in the public records of the Patent Office:—

"On the 2d of February, 1854, Prof. Page applied for a patent for an instrument identical in all its parts with that described as the Ruhmkorff coil. The Patent Office, upon a hasty examination, at first refused the claim upon the ground that the automatic circuit breaker, in connection with the induction coil, was described by D. Golding Bird, in the *London, Edinburgh and Dublin Philosophical Magazine*, for January, 1838. It so happened that the office had failed to notice the conclusion of Golding Bird's communication in which he says, "the credit of the invention must be given to Dr. Page." Attention having been directed thereto the Patent Office admitted Prof. Page's claim to originality, but subsequently refused the patent upon the ground that the invention had been dedicated to the public. How far this invention anticipated the Ruhmkorff coil will be seen from the descriptive catalogue of Daniel Davis, of Boston, published in 1840, in which he says that this induction coil affords a "light between separated charcoal points," and "charges the Leyden jar." The instrument is there called the "compound magnet and electrotome," and was subsequently made and sold under various names, such as "Page's Analysis of Shocks," "Separable Helices," etc. The identical instrument I find described in *Silliman's Journal*, Vol. XXXV., Jan., 1839. The electrostatic powers of this instrument as described are fully equal to the past editions of the Ruhmkorff coil, and I have been shown a programme of experiments recently made at Public School, No. 11, Brooklyn, N. Y., in which occurs the following announcement, "Page's Analysis of Shocks same as Ruhmkorff's Coil." These experiments were conducted by N. B. Chamberlain, of Boston. Mr. Chamberlain exhibits the sparks, the charging of the Leyden jar and all the beautiful experiments with the vacuum tubes with Page's coil, precisely as they are performed with the Ruhmkorff, the only difference being that the Page coil is on a smaller scale and much less expensive.

The intensifying power of the bundle of iron wires in the coil was discovered by Prof. Page and published by him in *Silliman's Journal*, Vol. XXXIV., for July, 1838, and the first application of it within the induction coil led to the development of its electrostatic properties.

With all these facts before us it is evident that the so called Ruhmkorff coil was the invention of Prof. Page, and the Imperial award of 50,000 francs to Ruhmkorff by the French Commission must have been made in entire ignorance of Prof. Page's claims, an oversight of American achievements by European savans already too common.

New York, Jan. 16, 1865. S. H. W.

Correspondence

Cone Pulleys for Given Velocities.

MESSRS. EDITORS.—In a late number of the SCIENTIFIC AMERICAN is a method of ascertaining the diameters of cone pulleys, which will do when definite velocities are not required, but as that is sometimes a desirable end I send the following rule:—Suppose the velocity of the upper or driving cone to be 100, the joint diameter of the two cones 20 inches, and the velocities required 75, 150, 225, 300. Write down the velocities required as above, and under each write that of the upper cone; add them together, and set the amounts under, as in addition, and make each amount the denominator of a fraction, of which the velocity of the upper or driving cone, say, is the numerator. Multiply the joint diameter, 20, by each of the fractions so found, and the products will be the several diameters of the pulleys upon the driving cone. The same operation, repeated with the velocities sought, as denominators, will give the diameters of the driven cone. Example:—

75	150	225	300
100	100	100	100
175	250	325	400

$100 \div 175 \times 20 = 11\frac{3}{7}$
$100 \div 250 \times 20 = 8$
$100 \div 325 \times 20 = 6\frac{2}{5}$
$100 \div 400 \times 20 = 5$

$75 \div 175 \times 20 = 8\frac{4}{7} + 11\frac{3}{7} = 20$
$150 \div 250 \times 20 = 12 + 8 = 20$
$225 \div 325 \times 20 = 13\frac{1}{1\frac{1}{3}} + 6\frac{2}{1\frac{2}{3}} = 20$
$300 \div 400 \times 20 = 15 + 5 = 20$

It may be objected to this method that it does not make allowance for the angle of the belt; but in the above example I find the variation to be but ·1 in a distance of 6 feet between shafts—a difference which would scarcely be perceptible in the tension of the belt. If, however, the distance at which the shafts are known are to run is known, and it is desirable to be accurate, one of the cones may be set back of the lathe the proper distance, and the others may be turned by a tape line until the tension is equal upon all the pulleys. I have found this to work well in practice, and it is simple enough to be within the reach of any mechanic who is likely to have cones to make. S. H. WILDES.

Central City, Col. Ter., Dec. 21, 1864.

Rules for Measuring Grain.

MESSRS. EDITORS:—I venture to offer you for publication the following rules for measuring grain. Dimensions are taken in inches, and the Winchester bushel—the standard of the United States—contains 2150·42 cubic inches:—

To measure grain in a bin, multiply the product of the length, breadth and depth by 10, and divide by 21504 for the number of bushels.

To measure grain in heaps:—Multiply the sum of the perpendicular and slant hights, their difference, and the perpendicular hight together, and the product by ·00048 when it is heaped in the middle of a floor; by ·00024 when heaped against the sides of a barn; by ·00012 when it is heaped in the corner of a barn; and in each case the last product will be the answer in bushels.

The second statement may be demonstrated thus:—Let a equal the slant hight, and b the perpendicular hight. Then $a^2 - b^2$ equals the square of radius of base of heap, and $(a^2 - b^2)3 \cdot 141592$ equals area of base of heap, and $(a^2 - b^2)3 \cdot 141592 \times b \div 3$ equals the solid contents of heap in inches, which being divided by 2150·42 and reduced, equals $(a^2 - b^2)b \times \cdot 00048$, which, since $a^2 - b^2 = (a+b)(a-b)$, becomes $(a+b)(a-b)b \times \cdot 00048$. Q. E. D. M. V. B. P.

Danville, C. E., Dec. 1864.

Hand Carding, Spinning, and Weaving.

MESSRS. EDITORS:—I have been a constant reader of your valuable Journal for many years, and have come to regard it as the fountain of knowledge.

This island is very much in need of a hand carding, spinning, and weaving machine for working up the cotton grown here. As labor is very cheap, many girls who are unable to do field work might make a livelihood at this branch of business. Can you inform me where such a machine can be purchased, and at what price, or with whom I can correspond in regard to the matter? JOHN MCDONALD.

Kingston, Jamaica, Jan. 6, 1865.

HARDENING AND TEMPERING STEEL.

Steel is hardened by being heated a bright cherry-red, and plunged in cold water. The brittleness and hardness are then modified by gradually warming the metal, either over a fire, or by placing it on a hot metal plate, or in an oven, or in an oil bath. Some large manufacturers of cutlery use a tempering oven, the temperature of which is regulated by a thermometer. This saves a great deal of high-priced labor, and secures a uniform result. The following degrees of temperature and corresponding colors of the steel, for different purposes, are given in many books:—

Corresponding Temperature.		
A very pale straw	430°	Lancets
Straw	450°	Razors
Darker straw	470°	Penknives — All kinds of wood tools
Yellow	490°	Scissors — Screw taps.
Brown yellow	500°	Hatchets, Chipping Chisels. Saws.
Slightly tinged purple	520°	
Purple	530°	All kinds percussive tools.
Dark purple	550°	Springs.
Blue	570°	
Dark blue	600°	Soft, for saws.

GUNS BURSTING IN ACTION.

At the first attack on Wilmington no less than six 100 pound Parrott guns are said to have burst. These guns are the best service guns in the world, and are acknowledged as such by unprejudiced persons. At the last attack on Wilmington, two fifteen-inch guns burst, doing but little injury, fortunately, to those in their vicinity. This will be hailed by those who condemn cast iron ordnance as proof positive of the correctness of their assertions, but it is no more evidence of the unfitness of cast iron for artillery than the explosion of a boiler shows wrought iron to be unfit for generating steam. In the excitement of battle very many exigencies arise, and omissions occur which frequently result in disaster, and it is mainly to such causes that we attribute the recent failure of the Parrot rifles and the large guns.

The official investigation at Washington into the explosions in question will, we hope, result in some specific verdict and make the true cause public.

Another Iron Letter.

In our impression for Dec. 2nd we described an iron letter, the pages of which were rolled at the Sligo Ironworks, Pittsburgh, Pennsylvania. The makers claimed that this iron was the thinnest ever produced. During the present week we have had some specimens of sheet iron brought under our notice which are nearly one-tenth thinner than the iron of the American letter. The plates were rolled by Messrs. T. W. Booker & Co., Mellingriffith Works, Cardiff. They are barely the 1,000 part of an inch in thickness. A piece 8 in. long by $5\frac{1}{4}$ in. broad, weighs $62\frac{1}{2}$ grains only. The quality of the plates is admirable. They possess toughness and flexibility in no ordinary degree. We have very little doubt that these plates are the thinnest ever produced.—*London Engineer.*

THE enormous demand that has sprung up for the series of dyes that are prepared from coal has probably no parallel in the history of color manufactures. Mauve, magenta, girofila, and other popular colors are all produced by scientific treatment of certain substances that are produced during the distillation of coal. It is said the discoverer of these dyes was a lad in the City of London School, now grown to man's estate, and enjoying an income of several thousands a-year as his share of the profits of the manufacture of these dyes.

IN Hitchcock's "Method of Forging Cannon," published on page 50, current volume SCIENTIFIC AMERICAN, some typographical errors occurred which changed the sense; the rings are said to be formed in a modification of the *tin* rolling machine. It should read *tire* rolling machine.

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Sliding Door Roller Sheaves.

The accompanying illustrations exhibitan important and simple improvement in sliding door sheaves. The wheel instead of revolving in a confined socket, rolls along a horizontal plane; the axle of the wheel moving the length of the slot in the same time that the wheel travels the length of the track.

By this arrangement the superior advantages of a roller over those of a wheel are secured in moving a door, the bed of a printing press, or any other burden which has a reciprocating motion. In the ordinary form the roller is inapplicable to a sliding door; but, by a modification, as exhibited in this sheave (Fig. 1), where the burden presses upon an axle instead of upon the periphery of the roller; the distance traveled by the roller is so much lessened that its application to the sheave is quite practicable.

Fig. 1.

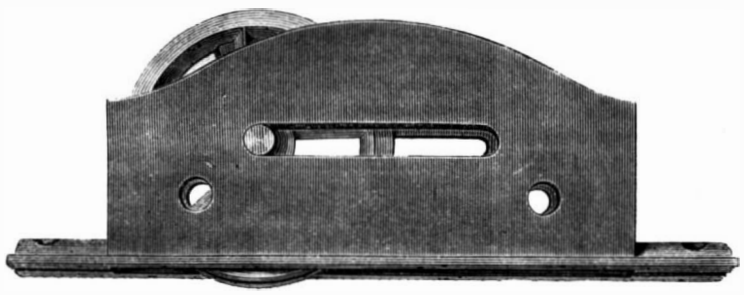
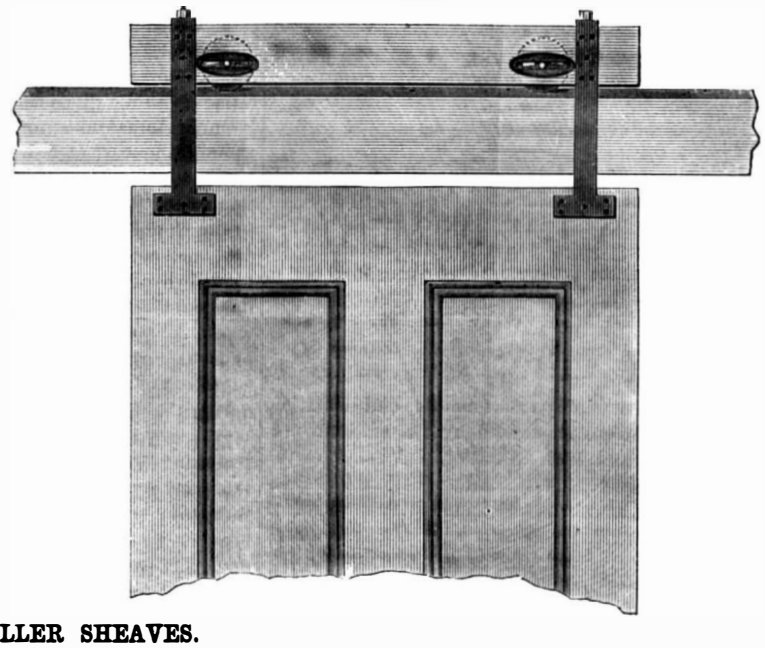


Fig. 2.



SLIDING-DOOR ROLLER SHEAVES.

The length of the slot is dependent upon the distance the door is required to travel; also upon the relation between the circumference of the wheel and that of the axle. In ordinary doors the length of the slot is about three inches long.

One advantage obtained by this improvement, as above shown, is the diminished friction and consequent ease of motion, but this is not the principal advantage. In common sliding door sheaves it has been found difficult to lubricate the working parts, and in consequence it is found after a year or two that the axle is ground away. This is so serious that the door settles gradually until it comes in contact with the floor or with the track and thereby prevents the moving of the door except by great exertion. The roller sheave most effectually prevents the occurrence of this evil, and herein is its principal advantage; for, there being no friction between the axle and the plane upon which it rolls, neither of them can wear away; hence the door must remain at the hight at which it was at first placed, and continue to move with ease for any length of time.

It is sometimes desirable to have the sheaves placed at the top of the door, in order to have the floor free from the track for the extension of a carpet beneath or for other reasons.

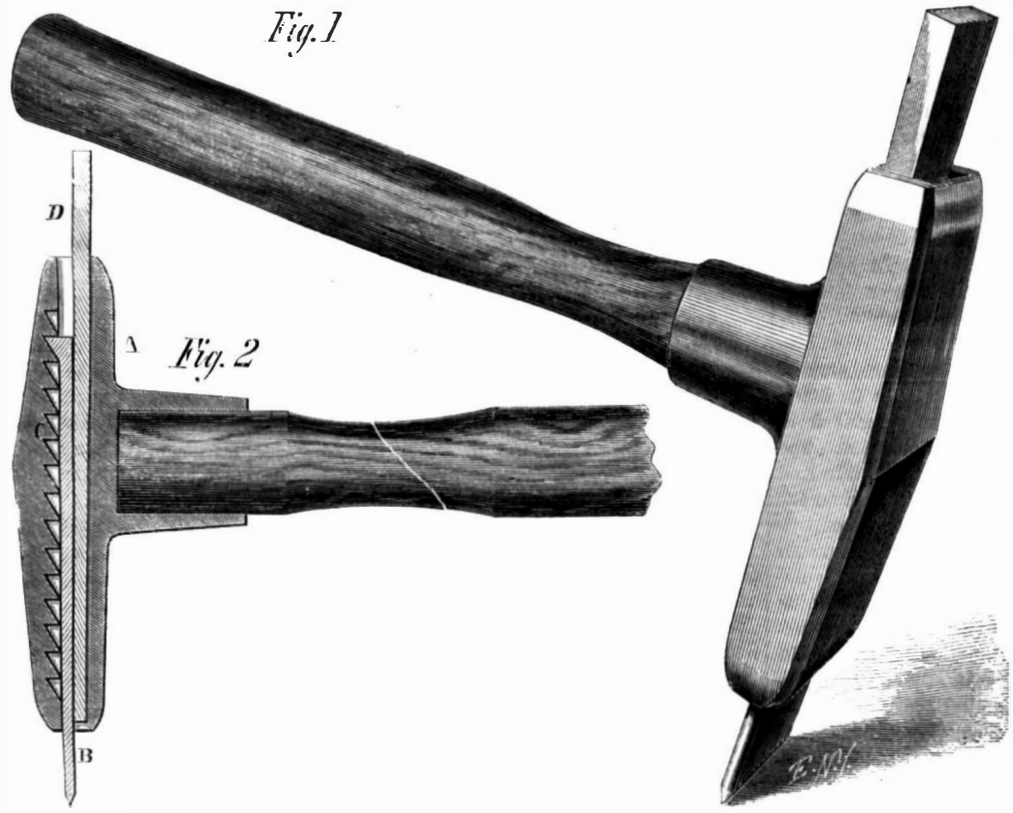
Doors may be hung at the top by this sheave, as shown in the engraving (Fig. 2), where two sheaves are inserted in a plank and placed above a beam carrying the track, over the door. The door is suspended by iron straps on either side of the beam, passing over the plank as an inverted stirrup. A screw inserted in this strap on top of the plank, raises or lowers the door at pleasure. The straps or stirrups slide up and down in a slight groove on the sides of the plank. In some cases, where it may be difficult to get at the screw so located, it is placed just above the door, the stirrups being secured, in this case, to the plank and made movable on the door. This arrangement for raising and lowering a door has been found advantageous in adjusting the joint between the two doors when they are in pairs; also the joint at the bottom where it meets the floor.

These sheaves are manufactured by Messrs. Newman, Onderdonk and Capron, No. 1,172 Broadway, New York. The invention was patented May 5, 1863, and June 21, 1864. Any information may be had by addressing the manufacturers.

Improved Mill-Stone Pick.

The inventor of this implement claims to have had long experience in this department of manufacture, and for a number of years past has been experimenting with a view to the production of an edge that would stand. The edges are hardened on a peculiar plan, and, compared with the old-fashioned pick, are acknowledged to be superior. The first cost of these picks will not exceed one-third that of the common tool, and the inventor asserts that one edge of this will out-last thirty of the common kind. They can be ground until worn out, and never need dressing. Another advantage in this pick is, that it is always the same tool, so that, having once become accustomed to its use, the work can be done with much more expedition and satisfaction than where change is continually made.

This fact may appear singular to impractical men, but it is nevertheless true, and a machinist that has the hang of his hammer, the carpenter of his saw, or the miller of his pick, will miss the familiar feeling, and work awkwardly if he is continually changing one for another. The weight can be added to or taken from at will by simply increasing the dimensions of the box. The details of the pick are merely a solid box head,, A, having the pick or cutter, B, confined in it by means of the teeth, C, and wedge, D. The teeth prevent the tool from moving up, and the wedge holds the same firmly in its place. It is also quickly detached for grinding, and in many other respects a most convenient tool, and desirable improvement over those generally used. The cutters are furnished by the manufacturers, D.C. Stone & Co., by whom this invention was patented through the Scientific Am. Patent Agency. The patent has been ordered to issue, and the claim will appear next week. For further information address the patentees at Kingston, N. Y.



STONE'S MILL-STONE PICK.

Crystallized Tin-plate.

Crystallized tin-plate is a variegated primrose appearance, produced upon the surface of tin-plate, by applying to it in a heated state some dilute nitro-muriatic acid for a few seconds, then washing it with water, drying and coating it with lacker. The figures are more or less beautiful and diversified, according to the degree of heat and relative dilution of the acid. Place the tin-plate, slightly heated, over a tub of water, and rub its surface with a sponge dipped in a liquor composed of four parts of aquafortis, and two of distilled water, holding one part of common salt or sal ammoniac in solution. Whenever the crystalline spangles seem to be thoroughly brought out, the plate must be immersed in water, washed either with a feather or a little cotton (taking care not to rub off the film of tin that forms the feathering), forthwith dried with a low heat, and coated with a lacker varnish, otherwise it loses its luster in the air. If the whole surface is not plunged at once in cold water, but if it be partially cooled by sprinkling water on it, the crystallization will be finely variegated with large and small figures. Similar results are obtained by blowing cold air through a pipe on the surface in passing from a fused to a solid state.

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NEW YORK, SATURDAY, JANUARY 28, 1865.

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THE SIZE OF HOLES IN FURNACE DOORS.

Carbon combines with oxygen in two proportions; one atom of carbon combining with one of oxygen to form carbonic oxide, C O, and one atom of carbon combining with two of oxygen to form carbonic acid, $C O_2$.

When an abundance of air is passed through a grate into the lower portion of a mass of red hot coal, each atom of the burning carbon combines with two atoms of oxygen to form carbonic acid gas. But if this gas struggles upward through a mass of red hot coal, where it is subjected to the action of an excess of carbon, each of its atoms gives up one atom of oxygen, becoming carbonic oxide, while the atom of oxygen given up combines with an atom of carbon also forming carbonic oxide.

As this carbonic oxide issues from the upper surface of the mass of coal, if it encounters atmospheric air at a red heat, each atom will combine with an atom of oxygen, forming again carbonic acid.

These facts indicate very clearly the proportion of air to be admitted above and below the grate. Each atom of carbon receives one atom of oxygen from below the grate to burn it to carbonic oxide, and one above the grate to complete its combustion to carbonic acid. Therefore one-half the air should be admitted below the grate and the other half above.

This conclusion, however, supposes the depth of coal in the furnace to be sufficient to effect the decomposition of all the carbonic acid formed, and the condition of the fire box such that all of the carbonic oxide issuing from the incandescent coals will be burned, provided air is present. Would it not be well to have these questions determined in the costly government experiments which are in progress?

DISPATCH FROM ASSISTANT SECRETARY FOX.

The following dispatch explains itself:—

WASHINGTON, Jan. 18, 1865.

MESSRS. EDITORS:—Your accurate appreciation of the monitors is finally vindicated off the coast of North Carolina, and I congratulate you upon the results. G. V. FOX, Asst. Sec.

SUGGESTION TO INVENTORS.—During our recent visit to the National currency bureau at Washington, we noticed that all the money packages were bound into packages by hand. It occurred to us at the time that some machine might be devised for this purpose.

A SENSIBLE NEW YEAR'S GIFT.

We have read with much satisfaction that very many employers during the past season improved the opportunity afforded by Thanksgiving to present each of their employees with a fat turkey in honor of the occasion. That this is a wise course none can doubt. So long as the memory of the turkey remains the services of the recipient will be zealous and the cost of the gift made up tenfold in the amount of work performed within a given time.

One instance however has come to our knowledge wherein the feast of fat things given by a manufacturing concern to its workmen was of more value than many turkeys. The Blake & Johnson Manufacturing Company, of Waterbury, Conn., last New Year's day, presented a copy of the SCIENTIFIC AMERICAN for one year to each workman in their employ. As our informant, Mr. William Patten, news-agent, through whom the papers are procured, tersely states, "the paper is furnished to the workmen as an acknowledgement of their faithful and satisfactory services during the past year."

It is very pleasant to record this fact, for it proves two things; that the Blake & Johnson Manufacturing Company are liberal employers and that their artisans are men of standing in their calling. When we hear, as we do, that the workshops in question are models of neatness and system, and that the jewellers' rollers made by them are superior to all others in this country, we feel that we only render simple justice to skilled workmen and business tact in making these facts public. Some steel rollers were once made by Messrs. Blake & Johnson for the English mint from American steel procured at Pompton Plains, N.J., and we have seen notices in a prominent English journal that these were the most serviceable rollers the mint ever possessed. We doubt not that the generosity of the firm in question will be remembered by the workmen, and that the information received through this journal will be worth many times the sum expended.

A GAS EXPLOSION.

An explosion of gas took place at the store of Messrs Lee, Bliss & Co., 314 Broadway, in this city, in the afternoon of January 17th, which may serve as a warning to people in dealing with leakages of gas. For a day or two previous a smell of gas had been noticed in the basement, and it appeared to come from the front wall. A gas fitter was sent for, and he cut through the masonry around the pipe by which gas was introduced into the building. He then directed an assistant to light a match, and try the pipe at a joint within the wall to see if the leak was at that point. On the application of the match, there was a violent explosion which threw the laths and plastering from the wall, and created a commotion throughout the neighborhood.

Illuminating gas, when unmixed with air or oxygen, is no more explosive than iron or dirt. A flaming torch might be thrust into one of the large receivers at the city gas works with perfect impunity; it would be extinguished as quickly as if it were immersed in water. The gas is combustible, but no combustible will burn unless brought into contact with oxygen. Burning is the combination of fuel with oxygen, and the presence of the oxygen is just as important as that of the fuel. When a jet of gas is burned the combustion goes on only at the outer surface of the volume of escaping gas, where the oxygen of the atmosphere can come in contact with it. Professor Doremus, at one of his lectures this winter at the Cooper Institute, showed that there is no fire in the middle of a gas jet, by introducing a thimble full of gunpowder into the centre of the flame and holding it there several seconds without burning it.

But if illuminating gas is mixed throughout with atmospheric air, and a spark is applied to it, the whole mass burns instantaneously, producing an explosion. The products of combustion are water and carbonic acid, and both are raised to a high temperature by the heat generated by the combustion. This elevation of the temperature causes great expansion of the volume, which may burst open the rooms or vessels in which the gas is confined.

In all cases of the explosion of illuminating gas it will be found that the gas had previously become mingled with atmospheric air. This almost necessarily occurs when gas leaks in a confined room. The proper precaution to be adopted is the thorough ventilation of the room before a light or flame is brought into it.

ADULTERATING LARD WITH WATER.

Lard is now worth from 20 to 24½ cts. per pound, and this high price is stimulating the practice of adulterations. We learn that the old plan of mixing water with lard is being extensively practiced. By pouring water into the lard and keeping it constantly agitated till it cools, some 20 or 25 per cent of water can be mixed with the lard.

Of all substances there is none in which adulterations can be more easily detected than in lard. It is only necessary to melt it at a temperature of 212°; if it melts without ebullition or bubbling it contains no water; and if it deposits no sediment it is probably pure. Sometimes lard is adulterated with starch; this may be detected by the addition of a solution of iodine, which will turn the starch first violet and then black.

Water is used to increase the weight of butter as well as that of lard By making the butter very salt its capacity for containing water is greatly increased. Hassall examined 48 samples of London butter and found water in all of them. The salt butters contained from 8.48 to 28.60 per cent of water, and the fresh butters from 4.18 to 15.43 per cent. The salt in the salt butters ranged from 1.53 to 8.24 per cent, and in the fresh butters from 0.30 to 2.91 per cent. The butter in the several samples was from 67.72 to 96.93 per cent, showing a proportion of combined salt and water from 3.07 to 32.28 per cent.

BEAM ENGINES.

The tenacity with which mankind cling to their opinions is proverbial. The prejudices of English Engineers against beam engines is remarkable. A late writer in the *London Mechanics' Magazine*, in an article on the Steam Engine says:—

"The beam engine is undoubtedly the most practical for slow motion, hence its universal adoption for pumping and blowing. The valves of these engines when of a large size, or above fifty horse power, nominal, are generally of the double beat kind. This valve is not perfect in its action, as practice proves that the expansion of the valves and the casing are unequal. The position of, or distance between, the seatings is not even, or the same when heated as when cool. It should be a rule to grind the double beat valve in its seats when hot, the top and bottom diameters being unequal, that is, the latter sufficiently small to pass through the former. In small valves this is not of much practical importance, but in those of the large kind, the evil is painfully perceptible. The defect is seen and felt in the opening and closing. The steam, acting on the top or larger surface, has more power over it when the valve is stationary than when in motion. The area of the opening in the center part should equal half the top seat."

Beam Engines for slow motion, indeed! The fastest steamers we have afloat and the quickest working engines in factories are beam engines, and when we want a high piston velocity we put up a beam engine because we get more "turns" out of them than any other kind for paddle vessels. The *Stockton*, a passenger boat between this city and Philadelphia, makes regularly 650 and 700 feet per minute piston speed; she has a beam engine rising 50 inches diameter and 12 feet stroke. The *Jesse Hoyt*, another fast bay steamer, 480 tuns burden, has a beam engine 48 inch cylinder and 12 feet stroke, and makes regularly on an average 576 feet per minute, burning 12 tuns of coal per 24 hours in so doing. The average boiler pressure is 30 pounds, and the trips are intermittent, or short, only 22 miles in length. Several are made in a day, and the average time for this distance is 65 and 70 minutes; it has been made in one hour with ease. The steam is worked expansively, cutting off at 8 feet, or three-fourths of the stroke; formerly the influx was stopped at one-fourth the stroke, but by altering the cut so as to follow 8 feet, 15 minutes better time was made, while the coal consumed was only one-half a tun greater.

It should be stated that the fires are kept banked

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all night on the fuel mentioned, and that the net consumption for 24 hours is 12 tuns.

The trouble in regard to double beat valves is overstated. Such difficulties formerly existed, but are measurably overcome. Of course if the metals composing the valves and chest are alike the expansion will be the same. For running in fresh water the valves and chest are generally made of cast iron, for little or no corrosion takes place; but for marine engines the case is different, and brass must be used for the valves and seats. It was formerly customary to use disks wholly of brass for the valves, which were bolted to columns in form like spools. This practice is now obsolete in the best shops, and the "spool" is very greatly enlarged, so that it is nearly the size of the valve itself.

In an 18 or 20 inch poppet valve, for we have some of this size, the brass seat is not more than an inch thick in the average, considered through the diameter of the valve. The difference in the rates of expansion is therefore very little. It may be here remarked that most of the complaints from poppet valves arise from defective workmanship. Most engineers and lathemen fancy it is an easy thing to make a pair of poppet valves, whereas there is no detail that requires nicer adjustment and closer attention. In shops where beam engines are built one man is kept on this work continually, and he soon acquires great proficiency in it.

Where the valves are taken apart in order to get them out of the chest, the exhaust valve for instance, it very often happens that the engineer is at fault and not the valves; for it is an easy matter to throw one of the disks out of line with the other by screwing up the bolts unequally, or allowing dust or dirt to fill in.

The writer quoted at the commencement of this article says in relation to beams:—

"Beams of cast iron are generally adopted for two reasons: first, simplicity of manufacture, and secondly, symmetry and cost, all of which are certainly matters of great consideration to the contractor. The chief object to be sought after in the manufacture of cast iron beams is an even diffusion of the material, so that, in cooling, the fiber of the metal can contract equally. In order to maintain lightness combined with strength, in large engines beams are in halves or sides, connected by distance pins. It is a rare occurrence for beams so constructed to fracture. The gudgeon bosses of cast iron beams would, if embraced with wrought iron bands shrunk on, be greatly strengthened. Beams of wrought iron plates and angle iron are coming much into use; but the cost is the greatest barrier to their general adoption. The presumed unsightly appearance of the rivet heads, angle iron, and laps of plates—each of these eyesores—is soon healed by the conviction that safety is guaranteed."

Beams to our engines are known as skeleton beams. The form is that of a diamond; the breadth being equal to half the length. The strap is wrought iron, and the center or skeleton cast. The two parts are firmly keyed together. Accidents have happened from breaking the strap; when this occurs a general smash up is the result. Ten years ago these occurrences were frequent, but they are now rare, for the dimensions of the straps have been much increased.

Ideas vary with localities. Our engineers think there is nothing more uncouth and lubberly than the solid cast iron beam, and they are termed by the irreverent "grate bars," from a remote resemblance to that useful appendage to a boiler. The cost of construction is certainly in favor of the solid beam; it has no advantage in weight, is unquestionably weaker, weight for weight, than the composite beam, and in point of appearance there is no comparison. The Stevens beam was complete from the hands of its designer and no material improvement has been made in our day.

A Mechanical Problem.

Make two broad-faced wheels of precisely the same size, weight and form. Let them be composed of wood and iron, but have the iron in one disposed around the perephery, and in the other at the center. Allow the wheels to start together and roll down an inclined plane; what will be their relative velocities? If on coming to the bottom of the plane they roll along a level floor or track, what will be their relative movements throughout their course?

PROFESSOR GROVE ON LIGHT.

In our last number we made a brief statement of Professor Grove's views of heat, as set forth in his treatise on the Correlation of Forces. The principal point of difference between him and some other writers on this subject, is in relation to the nature of the all-pervading ethereal fluid which fills the vast spaces between the planets and the stars, and which by its undulations, vibrations, or motions, conveys the forces of light and heat across these spaces. In his chapter on light, Professor Grove sets forth his views of this fluid more fully, and it seems that the point on which he insists is, that it is ponderable, or subject to the attraction of gravitation. He argues the point at great length, but the following paragraphs contain the substance of his conclusions:

"An objection to which the view I have been advocating is open, and a formidable one, is, the necessity involved in it of an universal plenum; for if light, heat, electricity, &c., be affections of ordinary matter, then matter must be supposed to be everywhere where these phenomena are apparent, and consequently there can be no vacuum.

"These forces are transmitted through what are called vacua, or through the interplanetary spaces, where matter, if it exist, must be in a highly attenuated state."

"The difference between the view which I am advocating and that of the ethereal theory as generally enunciated is, that the matter which in the interplanetary spaces serves as the means of transmitting by its undulations light and heat, I should regard as possessing the qualities of ordinary, or as it has sometimes been called gross, matter, and particularly weight; though, from its extreme rarefaction, it would manifest these properties in an indefinitely small degree; whilst, on the surface of the earth, that matter attains a density cognizable by our means of experiment, and the dense matter is itself, in great part, the conveyer of the undulations in which these agents consist. Doubtless, in very many of the forms which matter assumes, it is porous, and pervaded by more volatile essences, which may differ as much in kind as matter does. In these cases a composite medium, such as that indicated by Dr. Young, would result; but even on such a supposition, the denser matter would probably exercise the more important influence on the undulations. Returning to the somewhat strained hypothesis, that the particles of dense matter in a so-called solid are as distant as the stars in heaven, still a certain depth or thickness of such solid would present at every point of space a particle or rock in the successive progress of a wave, which particles, to carry on the movement, must vibrate in unison with it.

"At the utmost, our assumption, on the one hand, is, that wherever light, heat, &c., exist, ordinary matter exists, though it may be so attenuated that we can not recognize it by the tests of other forces, such as gravitation, and that to the expansibility of matter no limit can be assigned. On the other hand, a specific matter without weight must be assumed, of the existence of which there is no evidence, but in the phenomena for the explanation of which its existence is supposed."

PAPER FROM CANE.

Our old subscribers will remember that a good deal was said a few years ago about Lyman's process of preparing wood fiber for paper making. A long cannon was fitted with a steam-tight valve over the muzzle, the valve swinging on hinges and being closed with a latch. The cannon was filled with logs or sticks of wood, and steam was forced in under a very high pressure till all the pores of the wood were filled with it. The latch was then struck up, when the valve flew open, and the wood was shot out by the force of the steam. The pressure of the steam being removed from the outside of the wood, that within the pores expanded, and split the wood to shivers. The labor of cutting and trimming the sticks to prepare them for entering the cannon prevented the process from being economical, but it was thought that the cane of the southern cane brakes, being straight and free from limbs, might be worked with advantage. The following letter gives the result of the trial with cane.

Messrs. Editors:—My father, believing that in the great cane brakes of the south-west there was an inexhaustible source of supply for paper—provided the cane could be disintegrated, and the fibrous portions of the plant so cleaned as to leave it a pure cellulin, without too great an expenditure of fuel or chemicals—about three years since turned his attention to that subject. He thought that Lyman's steam explosive process was a step in the right direction for the preparation of the material for chemical treatment.

With this belief he leased of the owners of Lyman's patent the exclusive right to its use in the western and south-western states. To fully test its value—previous to erecting more extensive works—we had two of the Lyman disintegrating guns made at the Novelty works, New York, and put them in operation at this place in July, 1863. We continued to operate with them on cane until reluctantly convinced that the process was not only extravagantly wasteful of fuel, but dangerous to operate, and uncertain in results; the disintegration was not into ultimate fibers, but into long bundles of fibers, which to separate had to be treated with caustic alkali under pressure, precisely as straw is treated, and then again blown through a small opening by steam power. We did not abandon the use of the guns on hasty trial, but used them until we had expended many tons of coal and cane, keeping account of the cost. We then threw them out as utterly worthless in a commercial point of view; we, however, never abandoned the hopes of so freeing cane fiber as to make a good quality of paper.

My father went through an elaborate and analytical series of experiments which have resulted in perfect success. We are regularly producing paper like the enclosed which is three-fifths cane.

The process of disintegration and cleansing is effected without the use of alkali or any other chemicals, but by a system of sap volatilization which by active passing steam prepares the cane for any simple and cheap mechanical treatment which is certain in its results.

The steam that is used in volatilizing the sap and cementing principle of the plant is utilized in heating wash-water and the condensed steam is evaporated leaving a residue resembling burnt sugar (caromel), but more bitter, which when used for coloring liquors gives to them a delightful aroma; but we are now preparing to use it for a more utilitarian purpose.

By my father's process there is little of the plant wasted. By a simple machine of his invention we strip the leaves from the cane, which, when cured, make a most excellent food for cattle; our stock are kept on it and eat it with a relish. The non-fibrous portions of the plant are separated by washing and are also utilized. F. H. Sellers.

Sellers' Landing, Hardin Co., Ill.

[The sample sent us is a very fair article of wrapping paper, smooth and strong enough for most purposes for which wrapping paper is employed.—Eds.

SPECIAL NOTICE.

Silas S. Putnam, of Dorchester, Mass., has petitioned for the extension of a patent granted to him on April 15, 1851, for an improvement in window-curtain fixtures.

It is ordered that the said petition be heard at the Patent Office, Washington, on Monday, March 27, 1865, at 12 o'clock, M., and all persons are notified to appear and show cause, if any they have, why said petition ought not to be granted.

Vehicle for Medicine.—According to the *Chemical Gazette*, wafer paper is much used in France as a vehicle for powders. It may be made by heating two common smoothing irons and touching their surfaces with butter, and then pouring on one of them a small quantity of thin paste, made of rice or wheat flour, the other iron being instantly applied so as to press the water between the two faces and cook it sufficiently. The iron must not be hot enough to scorch it. In using the wafer cut it of the proper size aud dip it in water; place the powder on it and wrap or roll it up. It is said to go down like an oyster.

Bones are brittle in cold weather; a slight misstep may cripple a person for life.

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RECENT AMERICAN PATENT.

Improvement in Combs.—This invention consists in the application to combs of a metallic back, graduated as a ruler, and so applying it to the comb or comb teeth that the same may be removed on being broken or damaged, and a new comb or set of teeth easily and quickly inserted in place thereof. We have seen a neat little pocket or moustache comb made according to this invention. The comb part shuts into a case, and when it is opened the back of the case and of the comb constitute the ruler, which is graduated as minutely as could be desired; it occupies no more room than an ordinary comb for the same purpose, and, the advantage of always having a ruler in one's pocket is apparent. Its application to long combs is also apparent, for one usually knows where to find his comb and brush, and this invention enables him to find in the same place a rule intended for both ruling and measuring, thus avoiding ofttimes considerable search. The comb or teeth being removable enables the back or ruler part to be used over and over again, and it is contended that combs of this character will be sold as cheaply as ordinary bone combs. This invention is due to Dr. G. F. J. Colburn, of Newark, N. J.

One Horse Mowers Wanted.

A correspondent of an agricultural paper discourses upon the disadvantages which farmers labor under in not having mowing machines which run with small power. He says:—

"Will you or some of your mowing machine correspondents, tell me why there are no real one-horse mowers made and in the market? I am aware that there are machines called one-horse mowers, and I have known several being bought and tried with one horse, but invariably condemned because requiring more than the power of one horse to operate it. What is the difficulty? Simply this—so far as I have examined the machines, they are in all respects, including size, weight and shape, two-horse machines, except the use of thills instead of a pole, and a cutter-bar about three instead of four feet long. Being a one-horse farmer myself, so far as I am farmer at all, I want a mower that one horse will manage as easily as two horses usually do the two-horse machines, which is surely hard work enough for any horse. There are very many one-horse farmers in New England who rake and draw their hay with their one horse, and would be very glad to mow it with the same horse; very many also, like myself, have not physical health and strength to swing a scythe, but would be able to drive a mower, as they do the rake and hay cart. We use a one-horse team wagon half the weight and capacity of a two-horse wagon; a one-horse sled, plow, harrow, cultivator, roller, &c., each half the weight, strength, size, capacity, &c., of the ordinary two-horse implements, and in our "one-horse" circumstances we think we do so to advantage. Being somewhat of a mechanic myself, I have no doubt that it is practicable to build a mowing machine, properly proportioned throughout, that may be operated as easily with one horse as the other machines are now worked with two similarly sized horses, and do one-half the amount of work per hour—provided a boy of one-half the weight of a man rides upon it. I come to this conclusion after hearing the objections of several manufacturers, nearly all of which seem to resolve themselves into this, that "new patterns throughout would need to be made," which is of course true; but I think the demand for the machines would "make it pay."

Preserving Flowers by Glycerine.

Mr. C. R. Tichborne states, in the London *Artizan*, that, being desirous of preserving a vegetable *lusus naturæ* for some time, he submerged it in some weak glycerine, considering that that fluid would be less likely to destroy the tender organism, and also remembering that it had been found most efficient in the preservation of animal tissues. The glycerine answered its purpose most admirably, preserving the delicate parts of the plant and preventing decomposition. He immediately saw that the property of glycerine might be made available for certain pharmaceutical purposes, where it was desired to preserve or extract the aromata of vegetable products, such as elder, orange, or rose flowers, and also might be substituted for the oils and fats used in the purest process termed enfleurage. The glycerine need not be especially pure, but should be devoid of odor. The elder-flowers should be gathered when the corolla is fully expanded, but not too far gone; they should then be plucked from the stem, and packed firmly in wide mouthed bottles or jars, without crushing them; and the whole should then be covered with glycerine. Mr. Tichborne states that he has thus preserved flowers for two years, and, on distilling them, procured a water the perfume of which has equalled the most recent product. For the preservation of the aroma of the flowers he considers the employment of glycerine far superior to the system termed enfleurage, in which heat ii used.

Our thanks are due to H. Kilbourne, Esq., the efficient Chief Clerk of the Department of the Interior, also to Hon, D. Morris, Hon. James Brooks, Hon. Geo. H. Yeaman, Hon. E. C. Ingersoll, and to Senator Morgan, for public documents.

ISSUED FROM THE UNITED STATES PATENT-OFFICE

FOR THE WEEK ENDING JANUARY 17, 1865.

Reported Officially for the Scientific American.

☞ Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

45,902.—Method of Preventing Oil Barrels from Leaking.—David Ahl, M.D., Newville, Pa.:

I claim the composition, as herein specified, for the purposes herein substantially set forth.

45,903.—Harrow and Seeder.—D. L. and John M. Barlow, Cohoctah, Mich.:

We claim, first, The harrow, n, constructed and operated substantially as herein described.

Second, The harrow, n, in combination with the seeder, B, the wholeconstructed and operated substantially as and for the purpose herein set forth.

45,904.—Oyster Dredge.—Wm. Belbin, Baltimore, Md.:

I claim the combination, in an oyster dredger, of the rake bar, A, front rods, C, and rear rods, D, with the head, E, and swiveling link, F, when the rods, C, are curved, constructed and arranged as and for the purposes described.

45,905.—Harvester.—Jacob W. Bope, St. Louis, Mo.:

I claim the adjustable sliding platform or dropper hinged at or near its rear edge, as described, so that by the raising of the front edge, it performs the two-fold function of the dropping gavel, and at the same time operating as a perfect cut-off to arrest the falling grain.

45,906.—Harvester.—Jacob W. Bope, St. Louis, Mo.:

I claim, first, Hingiug the grain platform, which is arranged directly behind the cutting apparatus, at or near its center, substantially as described, so that it will vibrate upon a fixed point, and by the elevation of its front edge, perform the double function of discharging the completed gavel, and simultaneously therewith arresting, upon its front edge, the fall of the accumulating grain, as described.

Second, I claim operating the tilting platform, A, by means of the lever, D, with the chain or cord, C, in the manner as and for the purposes herein described.

Third, I claim the adjustable shield or guard, E, arranged and operating in connection with the grain platform, as herein described, for the purposes set forth.

45,907.—Whitewash Brush.—W. B. Burtnett, New York City, and James P. McIntosh, Brooklyn, N. Y.:

First, We claim a brush block in combination with a slotted way, E, substantially as described.

Second, We claim a slotted way, E, in combination with a ferrule, C, substantially as described.

Third, We claim a brush with its handle applied thereto when the several parts are constructed and operated substantially as described.

45,908.—Gas or other Retorts.—John Chilcott, Brooklyn, N. Y.:

I claim, first, Surrounding the bottom, sides and top of a gas or other retort, with a jacket or casing, C, between which and the retort a continuous system of flues, E E, is formed by means of longitudinal partitions, having openings at opposite ends alternately, whereby the flame is caused to circulate back and forth several times along, and once all around the retort, substantially as and for the purpose herein specified.

Second, The jacket or casing, C, divided longitudinally into two parts and having the flue partitions attached to its interior so as to be detachable from the retort, substantially as and for the purpose herein specified.

45,909.—Comb.—G. F. J. Colburn, Newark, N. J.:

I claim a comb having graduations or a rule arranged therewith, substantially as described.

45,910.—Oscillating Valve.—Guy Davis, Syracuse, N.Y.:

I claim the conical suspended valve, I, with its openings, J J, communicating with the steam chest and the induction openings, K K, and eduction opening, T; communicating with the cylinder, substantially as described.

45,911.—Portable Forge.—John H. Dickerson, Cincinnati, Ohio:

I claim, first, The combination of the pan, A', hinged plate, Y, bolts, W W, and catch, X, constructed and employed as herein specified, to constitute a forge bed and screen while in use, and a close and secure tool box in traveling.

Second, The hinged frame, G, and brace rods, L L, employed to support the bellows, while in use, and adapted to be compactly folded for transportation.

Third, I claim the combination of the pan, A', screen, Y, bellows, E C, stand, G, lever, J, and braces, L, all constructed and arranged substantially as and for the purposes set forth.

45,912.—Cartridge Retractor for Many-chambered Fire-arms.—W. C. Dodge, Washington, D. C.:

I claim, first, the ejection, simultaneously, of two or more cartridge cases from a many-chambered fire arm, in the manner and by the means substantially as herein set forth, whether the chambers be stationary or revolving, and whether loaded at the front or rear.

Second, I claim the retractor, a, provided with the stem, b, and spring, c, or their equivalents, in combination with the cylinder or barrels of a many-chambered fire-arm.

Third, I claim providing the retractor, a, with a stem which is made to extend through the cylinder or barrels, and project at either the front or rear end thereof, for the purpose of being operated, as shown and described.

45,913.—Revolving Flood Gate.—John Du Bois, of Williamsport, Pa.:

I claim, first, A centrally balanced revolving flood gate, constructed and operating substantially as herein described,

Second, Supporting the gate, C, in its bearings in such manner that it shall be allowed to rise bodily in the act of opening to allow the water to escape, and using the arms, c c, or equivalent means for holding the gate down and preventing it from turning, substantially as described.

Third, The abutment, b, on the floor of the chute, when used in conjunction with a revolving flood gate, operating substantially as described.

Fourth, A revolving flood gate, which is so arranged and constructed that it will be opened by the water in the basin rising above a certain determined level, substantially as described.

45,914.—Method of Removing Incrustation from Boilers.—Davis Embree, Dayton, Ohio:

I claim the use of still slops to prevent or remove incrustation by lime in steam boilers, and the use of quicklime, in the manner herein substantially set fortlr, to prevent such incrustation.

45,915.—Manufacture of Illuminating Gas.—William Elmer, New York City. Patented in France Dec. 5, 1864:

I claim the process of manufacturing gas by distilling the gas stock in one retort and converting the volatile product of the distillation and illuminating gas in another retort in the presence of a material which, when at a high temperature, will absorb and fix the oxygen contained in the volatile product of the distillation, the process being conducted substantially as set forth.

I also claim the process of manufacturing illuminating gas by distilling the gasstock in one retort and converting the volatile product of the distillation into illuminating gas in another retort in the presence of an additional quantity of steam to that obtained from the gasstock, and of a material which will absorb and fix the oxygen contained in the volatile product of the distillation and in the additional steam, the process being conducted substantially as set forth

45,916.—Smoking Pipe.—Frederick Fickey, Jr., Baltimore, Md.:

I claim the use of the metallic cup, B, in combination with the absorbent bowl of a tobacco pipe, substantially in the manner and for the purpose set forth.

45,917.—Coal-mining Machine.—John S. Fisk, of Meadville, Pa., and James Westerman, of Sharon, Pa.:

We claim the combination in a coal-mining engine of one or more circular saws on a single mandrel, with an adjustable feeding mechanism, arranged on a moving truck, substantially in the manner described and for the purpose set forth.

45,918.—Mode of Ventilating Mines.—John S. Fisk, of Meadville, Pa., and James Westerman, of Sharon, Pa.:

First, We claim the combination with a forcing pump or engine, located at or near the mouth of the mine, of one or more reservoirs for compressed air located within the mine, at a distance from the engine and near the working point, substantially in the manner herein described, for the purpose of ventilating the mine, and of exer ting a uniform pressure as a motor, as set forth.

Second, The combination of one or more reservoirs, arranged substantially as herein described, with a large induction and small eduction pipe and stop valves, as and for the purpose set forth.

45,919.—Magazine or Self-loading Fire-arms.—Walter Fitzgerald, of Boston, Mass.:

I claim the breech block, D, and guard lever, E, so connected by the pins, c d, and slots, b u, that the vibration of the lever, E, will give the breech block the required motions in its passage within the breech, C, substantially in the manner and for the purposes specified.

Second, I claim, in combination with the breech block, D, the cartridge guide, F, and cartridge discharger, H, when constructed and arranged to operate together with a magazine, substantially as herein described and represented.

Third, I claim the percussion rod, G, constructed and operated substantially in the manner and for the purpose set forth.

Fourth, I claim locking the magazine, substantially in the manner set forth.

45,920.—Horse Rakes.—David D. Gitt, of Arendtsville, Pa.:

I claim the employment, in combination with any part of the rake, which, for the purpose of discharging the rake, is moved, or movable, of a weight, under the arrangement herein described, so that while the center of gravity of the lifting apparatus is back of the fulcrum, it shall, on the rake being operated for discharge, be displaced and thrown forward in the manner herein described.

Second, Combining with the teeth made of wire or other material, hinged to or hung upon a fulcrum bar, a spring staple, under the arrangement herein described, so as to bear with yielding pressure on the teeth.

45,921.—Horse Powers.—Samuel B. Haines, of Lancaster, Pa.:

First, I claim the vibrating yokes, H, in combination with the levers, D, and the conical pivot, L, substantially as set forth,

Second, I also claim the hollow conical pivot, L, when cast in one piece with the head plate, K, extending so as to fix the gearing at the circumference of the main wheel, A, substantially as specified.

45,922.—Artificial Fuel.—William Halsted, of Trenton, N. J.:

I claim the combination and mixture of the ingredients, in the manner and proportions above described.

45,923.—Seed Sower.—J. M. Harshbarger, of Brandonville, West Va.:

I claim a seed slide, in two or more sections, adapted to be connected and disconnected by the employment of a link, c, or its equivalent, substantially as and for the purpose herein described.

45,924.—Corn Sheller.—Daniel Hutchinson, of Fort Ancient, Ohio:

I claim the disks, C and D, and the breast, h, when combined and arranged relatively to each other, in the manner and for the purpose specified.

45,925.—Straw Cutter.—John C. Kenedy, of Logansport, Ind.:

I claim, first, The described arrangement of the diamond or angular-shaped sliding sash or frame, D D D, horizontal knives, b B, when constructed and arranged, substantially as described and for the purposes set forth.

Second, I claim the inclined knives, a A, when constructed and operated by the rod, F, and lever, E, substantially as and for the purposes set forth in the specification.

45,926.—Sod Cutter.—Wm. A. L. Kirk, of Hamilton, Ohio:

I claim, first, The arrangement of frame, A, rollers, B and C, and rod-cutting blade, E e e' e'', substantially as set forth.

Second, The parts, A B C D D' E e e' e'' F G K and L, as herein arranged and combined.

45,927.—Bumper Spring.—Robert Levington, of Monroe, Mich.:

I claim the protector, K, and the yoke, J, in combination therewith, as is clearly set forth and described.

45,928.—Forging Apparatus.—Edward F. McFarland, of Worcester, Mass.:

I claim, first, Constructing the stem, D', of a hammer, D, of a spring, which is attached at its upper end to a crank shaft, a, substantially as described.

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Second, The combination of a hammer, D, spring stem, D', crank shaft, a, and lever, E, operating substantially as described.

Third, The use of shelves, g g, adapted to support the hammer, D, when not in use, substantially as described.

Fourth, The application of a counter weight, h, which is suspended by a spring, k, to a hammer, or its equivalent, which is also suspended by a spring stem, substantially as described.

45,929.—Side-hill Plow.—Elijah McKesson, of Philips Mills, Pa.:

I claim, first, The double mold board, having a triangular front, corners to lock in the groove of the land side, and a pointed projecting termination, constructed, arranged and operating substantially as and for the purposes set forth.

Second, The combination of the shoes, 1 and 2, with the mold board and land side and share, when constructed, arranged and operating, substantially as described.

45,930.—Detachable Flat Top and Elevated Cooking Stove.—John McKnight, of Philadelphia, Pa.:

I claim, first, So constructing a cooking stove in two sections that it can be converted from a flat-top stove to an elevated oven stove, or vice versa, substantially in the manner and for the purpose herein set forth.

Second, The hollow projection, a', at the rear of the ash pit and below the fire grate, the said projection communicating with the flue, G, as and for the purpose specified.

Third, The detachable hollow casing, H, forming a communication between the ash pit, B, and flue, G, as and for the purpose set forth.

45,931.—Wrenches.—George Meader, of Ottawa, Ill.:

I claim as a new article of manufacture the adjustable wrench, constructed and operated as herein described.

45,932.—Carpenter's Gages.—George Miller, of Washington, D. C.:

I claim a gage, constructed substantially as described and for the purpose specified.

45,933.—Fire Chamber Clearer.—Geo. Rodney Moore, of Lyons, Iowa:

I claim the attachment of the plate or clamp, C, or its equivalent, to the grate, E, substantially in the manner and for the purpose set forth.

45.934.—Cultivators.—Elias C. Patterson, of Chicago, Ill.:

I claim, first, The curved levers, A B C D, constructed and operating substantially as described.

Second, The combination of the curved and straight levers, constructed and operating substantially as described.

Third, The combination of the curved and straight levers with the plows, constructed and operating substantially as described.

Fourth, The peculiar form and arrangement of the middle-rear plows, in connection and combination with the two outside rear plows, all constructed and operating substantially as described.

45,935.—Artificial Fuel.—F. C. Payne, New York City:

I claim, first, A fuel composed of a conglomerate of coal screenings, or small particles of coal, and hydraulic lime, substantially as herein described.

Second, The use of plaster of Paris with hydraulic lime, substantially as herein described, in cementing together coal screenings, or small particles of coal, to render the latter serviceable as fuel.

45,936.—Laths for Buildings.—Dewey Phillips, Shaftsbury, Vt.:

I claim tongued and grooved laths, formed with grooves in their surfaces, receiving the mortar, substantially as specified.

45,937.—Floor Covering.—Anson H. Pratt, Yellow Springs, Ohio:

I claim the application and use of figured or ornamented paper, printed with water colors, to floors, as a substitute for oil cloth, and carpets, as herein described, whether stationary or movable.

45,938.—Mangle.—William Price, Cincinnati, Ohio:

I claim encasing the working parts of a mangle, the case being so constructed and hinged as to let down and form the support for guiding the articles in a line between the pressing rollers and fold up, and close together so as to protect the working parts when not in use, substantially as herein specified.

45,939.—Car Coupling.—Martin Rinehart, Monroe, Mich.:

I claim the combination of the sliding block, A, apron, B, with the hook, C, and link, d, substantially as described and for the purpose set forth.

45,940.—Washing Machine.—George W. Sayre, Pisgah, Ohio:

I claim the combination of the adjustable oscillating frame, K provided with cranks, pitmen, pendants, and beaters; with the adjustable weight, L, and scroll bottom, B, arranged and operating in the manner and for the purpose substantially as described.

45,941.—Condenser.—John M. Spiegle, Philadelphia, Pa.:

I claim the use, in connection with the air pump, of a condensing steam engine, of the perforated tubes, d and e, or their equivalents for introducing jets or streams of air into the water as it passes from the air pump to the hot well, as set forth.

45,942.—Horse Rake.—A. B. Sprout, Hughesville, Pa.:

I claim, first, Making a curved rake tooth, of a triangular sectional shape, (or its equivalent, semi-elliptical or semi-circular) and so applied that the flat side shall be on the inner side of the curve to endure the tensional strain, while the rear salient edge shall act as a stiffener to the tooth.

Second, I claim the combination of a tooth of a triangular sectional shape (or its equivalent, semi-eliptical or semi-circular) and with a flat side on the inside of the curve of the tooth, with a coiled spring by which it is attached to the head, and by means of which its elasticity is increased.

Third, I claim the plates, C c, adapted to be secured in position by the screw, c', substantially and for the purpose specified.

Fourth, I claim the spool, C2, c2, c3, constructed and arranged substantially as described, and adapted for the attachment of the spring, A, in the manner set forth.

45,943.—Piano Fortes.—Maurice Vergnes, New York City. Ante-dated Jan. 2, 1865:

I claim, first, The application to a clavichord instrument of a mechanism to operate a hammer upon a drum in the manner substantially as above described.

Second, The use of the slide, H, and the curb straps to hold the hammer in the condition to produce the roll of the drum, in the manner substantially as above described.

45,944.—Apparatus for Amalgamating Metals.—Owen G. Warren, New York City.:

I claim, first, Pouring quicksilver down through a sieve or strainer into a mass of comminuted ores and water, which has been subjected to a cooking process to gather the ores contained, in the manner substantially as above described.

Second, Obtaining the metals in their successive degrees of fineness by successive leeching with quicksilver poured down through a strainer into the ores and water, and successive gatherings of the amalgam formed, in the manner substantially as above described.

45,945.—Oil Lamp.—Edward Weissenborn, Hudson City, N. J.:

I claim the sponge, C, the follower, D, screw, E, and movable winged nut, F, applied in combination with each other, and with the oil cup, and operating substantially as herein specified.

45,946.—Screw Nicking Machine.—Jason A. Bidwell (assignor to himself, H. J. Litchfield, Daniel M. Robertson, and Asaph Churchill), Boston, Mass.:

I claim, first, The jaws, E E, sliding blocks, A A', and controling spring, K, when combined with each other, and with a circular saw, I', substantially in the manner and for the purpose herein set forth.

Second, The arrangement and combination of the sliding blocks, A A', with the upright, B, slotted side levers, O O, and operating lever, M, or their equivalents, substantially in the manner and for the purpose herein set forth.

45,947.—Casting Molten Metal.—Joseph De Rosthorn Vienna, Austria, assignor to Clemens Herschel, Davenport, Iowa:

I claim the improved method of operating to increase the density and strength of metallic castings, substantially as set forth.

45,948.—Grate.—Loomis G. Marshall, Mokena, Ill.: assignor to himself and F. W. Hughes, Pottsville, Pa.:

I claim a conical or angular shaped grate, formed of bars sloping from the inside to outside, as herein described and for the purposes set forth.

45,949,—Faucet.—Robert Murray, Boston, Mass., assignor to himself and James W. Tufts, Medford, Mass.:

I claim the improved faucet having its valve shaft arranged in the prolongation of the axis of its induction tube and pivoted in or at the inner end thereof, and made with its inner journal so channeled as to enable a fluid to pass into and through it while passing from the induction tube into the valve case, the faucet being in other respects as specified.

45,950.—Material for Making Boxes, etc.—Wm. Painter, Baltimore, Md., assignor to himself and Charles Painter, Owing's Mills, Md.:

I claim as a new article of manufacture the asphaltic board, made substantially as described, for the manufacture of boxes, packages, and other articles.

45,951.—Packing for Rifled Projectiles.—Frederika Schenkl, Boston, Mass., administratrix of John P. Schenkl, deceased, assignor to self and Edward A. Dana, Brookline, Mass.:

I claim the combination of a paper mache sabot, with a metallic ring at top, and a ring and disc of metal at the base to protect it, substantially in the manner described.

45,952.—Self-loading Fire Arms.—Christopher M. Spencer (assignor to Spencer Repeating Rifle Company) Boston, Mass.:

I claim, first, The compound magazine inserted in the stock of the piece, and consisting of two metallic tubes, constructed and operating substantially in the manner described.

Second, In a double tube magazine chamfering the inner side of the forward end of the inner tube, F, in the manner and for the purpose described.

Third, The arrangement of the groove, c, and catch, h, for conjoint operation, as specified.

Fourth, The combination and arrangement of the cap, G, arm, H, recess, d, and pin, d', substantially in the manner described.

Fifth, The combination of the receiver, B, tube, D, nut, E, and stock, A, in the manner and for the purpose set forth.

45,953.—Apparatus for Winding Thread from the Skein.—James Crutchett, Stroud, Eng. Patented in England Aug. 23, 1864:

I claim, first, The combination of the sliding arms, a a a a a a, figures 1, and 3, with the curved finger, d, for adjusting the apparatus to the size of the skein and the folding joint, G, for folding the same into a convenient portable form as above described.

Second, I also claim the application of the thumb screw, figure 6, with the slots, f f f f f, and the projections, g g g g g g, for the purpose, and in the combination above described.

Third, I claim the foregoing arrangement of the reel as illustrated in figures 1, 3, 4, 5, 6, in combination with the winding apparatus represented in figures 7, and 8, all for the purposes above described.

45,954.—Astronomical Instruments.—Charles Emmanuel, Paris, France:

I claim the astronomical instrument herein described, in which a theodolite, an equatorial and an ecliptic instrument are combined, affording the means of ascertaining immediately the position of the heavenly bodies in relation to the horizon, equator and the ecliptic substantially in the manner herein set forth.

45,955.—Steam Boiler.—Louis Emile Constant Martin, London, Eng. Patented in England April 28, 1864.:

I claim the arrangement of one or more fires substantially in the combination described, to generate the usual products of combustion, with one or more auxiliary incandescent fires, arranged on one or more refractory hearths, substantially as described, through which these usual products are carried, and which after being transformed into combustible gases pass through one or more flues into one or more chambers of combustion where these ultimate gases are ignited, and thus effect a large economy in fuel.

45,956.—Fire Bank.—Halsey H. Baker, New Market, N. J.:

I claim, first, A fire bank composed of a plate or combination of plates fitted to the fire-pot or fire-box of a stove, range or furnace to lie upon the fire substantially as herein described.

Second, Providing such a fire bank with one or more openings and valves or shutters substantially as and for the purpose herein described.

Third, The construction of such a fire bank of two or more plates hinged together in such a manner as to fold substantially as herein described for the purpose of enabling it to pass through the door of a stove or furnace.

Fourth, Providing such a fire bank with a hook or loop, i, so applied in combination with a hinge or hinges that it will fold by gravitation when suspended by said hook or loop substantially as and for the purpose herein set forth.

45,957.—Coal Oil Stove.—William B. Billings, New York City:

I claim, first, The use and adaptation of the body or sides of the stove or range, D, to serve as and perform the office of a flue or chimney over the lamp or oil holder, A, substantially as described and for the purposes set forth.

Second, The attaching of one or more air guides, cones or deflectors in the diaphragm, C, and the adjustment of the same in the stove or range, F, substantially as described and for the purposes set forth.

Third, The arrangement of the diaphragms, C, and, g g, thus forming an air chamber between the oil holder and stove or range, substantially as described and for the purposes set forth.

Fourth A non-conductor of heat used a packing between the stove stove and the oil holder, arranged substantially as described and set forth.

Fifth, The insulation of the lamp or oil holder by non-contact with the heater, stove or range, substantially as described and set forth.

45,958.—Safety Brakes for Horse Powers.—Joseph C. Bird, Rising Sun, Md:

I claim in combination with the trigger or lever, D, the stop or catch which prevents it from rising beyond a given point, which would otherwise apply the brake without the parting or flying off of the belt, substantially as herein described.

45,959.—Rudder.—Thomas G. Crosby, Buffalo, N. Y., assignor to Bushnell Strong and Marjoric H. Crosby:

I claim constructing a rudder for vessels with concave sides as herein substantially set forth.

45,960.—Apparatus for Rendering Lard, &c.—Thomas Hopkins, Cincinnati, Ohio:

I claim, first, The collander C c c', formed and adapted to operate as set forth.

Second, The dipper D D,' d d,' d," formed and adapted to operate as set forth.

Third, In the described combination, I claim the devices F G G', g, H K, and L,' or their equivalents, for enabling a crane to be shifted from place to place.

Fourth, The grapple T U U', v, V, w, W X Y Z Z,' formed and operating substantially as set forth.

45,961.—Manufacturing Fertilizing Phosphates.—G. A. Liebig and E. K. Cooper, Baltimore, Md:

I claim the process substantially as described above, for producing a fertilizing phosphate containing soluble phosphates.

RE-ISSUES.

1852.—Mortising Machine.—Stephen S. Bartlett, Providence, R. I., and Thomas H. Dodge, Worcester, Mass., assignees of said S. S. Bartlett. Patented Sept. 21, 1861:

We claim, first, Giving the bed or table in a mortising machine two independent supports so that the upper support may be loosened to permit the bed or table being adjusted or placed in a horizontal or inclined position, while the bottom support prevents the table or bed from sliding or dropping down bodily during the operation whereby mortises can be cut perpendicular through the timber, or beveled to any angle required.

Second, So combining the bed or table in a mortising machine, with its supporting mechanism, as that said table or bed can be freely rocked back and forth by the operator upon a center or axis of motion above the support upon which it rests and turns, whereby mortises with perpendicular or inclined ends can be cut at the will of the operator substantially as and for the purposes described.

Third, The combination of the head piece, G, sliding head stock, L, and its lever adjusting fulcrum or collar, K, with lever, F, and arbor, E, substantially as and for the purposes set forth.

Fourth, The combination of the platform, B, and stand, D, with the main frame and supporting piece, f, substantially as and for the purposes set forth.

Fifth, So arranging, in a mortising machine the sliding or movable wrist or collar by which the change of motion of the arbor and chisel is obtained, as that it shall be above or higher than the platform upon which the material to be mortised rests, whereby it is comparatively free and safe from flying chips or dirt and other clogging matter.

1853.—Attachment for Tackle Blocks.—George Focht, Reading, Pa. Patented Sept. 28, 1858:

I claim so attaching a tackle block or pulley, that it may turn freely in all directions, and be retained in the proper relative positions with the rope when the strain on the rope ceases, substantially as described.

The combination of the stud piece of the pulley, with the spindle having a spiral spring around its other end, substantially as, and for the purpose described.

The combination of the stud piece of the pulley with a spindle, with plate, F, having a bell mouthed or flaring socket, as and for the purpose described.

Extending the sides or edges of the frame of the pulley over and beyond the edge of the wheel, and curling or rounding outward the edges of this frame, so as to present a smooth, rounded surface for the rope to strike against, thereby lessening the wear upon the rope substantially as described.

DESIGNS.

2,018.—Statuette.—Edward I. Kuntze, New York City.

2,019 to 2,023.—Carpet Patterns.—Elemir J. Ney (Assignor to the Lowell Manufacturing Company), Lowell, Mass. Six Cases.

2,024.—Group of Statuary.—John Rogers, New York City.

TO OUR READERS.

PATENT CLAIMS.—Persons desiring the claim of any invention which has been patented within thirty years, can obtain a copy by addressing a note to this office, stating the name of the patentee and date of patent, when known, and enclosing $1 as fee for copying. We can also furnish a sketch of any patented machine issued since 1853, to accompany the claim, on receipt of $2. Address MUNN & CO., Patent Solicitors, No. 37 Park Row, New York.

MODELS are required to accompany applications for Patents under the new law, the same as formerly, except on design patents, when two good drawings are all that are required to accompany the petition, specification and oath, except the Government fee.

RECEIPTS.—When money is paid at the office for subscriptions, a receipt for it will always be given; but when subscribers remit their money by mail, they may consider the arrival of the first paper a *bona-fide* acknowledgement of our reception of their funds.

BINDING.—Those of our subscribers who wish to preserve their numbers of the SCIENTIFIC AMERICAN for future reference, can have them substantially bound in heavy board sides, covered with marbled paper, and leather backs and tips, for $1,00 per volume.

INVARIABLE RULE.—It is an established rule of this office to stop sending the paper when the time for which it was pre-paid has expired.

PATENTS

GRANTED

FOR SEVENTEEN YEARS.

MUNN & COMPANY,

In connection with the publication of the SCIENTIFIC AMERICAN, have acted as Solicitors and Attorneys for procuring "Letters Patent" for *new inventions* in the United States and in all foreign countries during the past *seventeen years*. Statistics show that nearly ONE-THIRD of all the applications made for patents in the United States are solicited through this office; while nearly THREE-FOURTHS of all the patents taken in foreign countries are procured through the same source. It is almost needless to add that, after *seventeen years'* experience in preparing specifications and drawings for the United States Patent Office, the proprietors of the SCIENTIFIC AMERICAN are perfectly conversant with the preparation of applications in the best manner, and the transaction of all business before the Patent Office; but they take pleasure in presenting the annexed testimonials from the three last ex-Commissioners of Patents.

MESSRS. MUNN & CO.:—I take pleasure in stating that, while I held the office of Commissioner of Patents, MORE THAN ONE-FOURTH OF ALL THE BUSINESS OF THE OFFICE CAME THROUGH YOUR HANDS. I have no doubt that the public confidence thus indicated has been fully deserved, as I have always observed, in all your intercourse with the office, a marked degree of promptness, skill, and fidelity to the interests of your employers. Yours very truly,

CHAS. MASON.

Judge Mason was succeeded by that eminent patriot and statesman, Hon. Joseph Holt, whose administration of the Patent Office was so distinguished that, upon the death of Gov. Brown, he was appointed to the office of Postmaster-General of the United States. Soon after entering upon his new duties, in March, 1859, he addressed to us the following very ratifying letter.

MESSRS. MUNN & CO.:—It affords me much pleasure to bear testimony to the able and efficient manner in which you discharged your duties as Solicitors of Patents, while I had the honor of holding the office of Commissioner. Your business was very large, and you sustained (and I doubt not justly deserved) the reputation of energy, marked ability, and uncompromising fidelity in performing your professional engagements.

Very respectfully, your obedient servant,

J. HOLT.

Hon. Wm. D. Bishop, late Member of Congress from Connecticut succeeded Mr. Holt as Commissioner of Patents. Upon resigning the office he wrote to us as follows:

MESSRS. MUNN & CO.:—It gives me much pleasure to say that, during the time of my holding the office of Commissioner of Patents, a very large proportion of the business of inventors before the Patent Office was transacted through your agency; and that I have ever found you faithful and devoted to the interests of your clients, as well as eminently qualified to perform the duties of Patent Attorneys with skill and accuracy. Very respectfully, your obedient servant,

WM. D BISHOP.

THE EXAMINATION OF INVENTIONS.

Persons having conceived an idea which they think may be patentable, are advised to make a sketch or model of their invention, and submit it to us, with a full description, for advice. The points of

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novelty are carefully examined, and a written reply, corresponding with the facts, is promptly sent, free of charge. Address MUNN & CO., No. 37 Park Row, New York.

As an evidence of the confidence reposed in their Agency by inventors throughout the country, Messrs. MUNN & CO. would state that they have acted as agents for more than TWENTY THOUSAND inventors! In fact, the publishers of this paper have become identified with the whole brotherhood of inventors and patentees, at home and abroad. Thousands of inventors for whom they have taken out patents have addressed to them most flattering testimonials for the services rendered them; and the wealth which has inured to the individuals whose patents were secured through this office, and afterwards illustrated in the SCIENTIFIC AMERICAN, would amount to many millions of dollars! Messrs. MUNN & CO. would state that they never had a more efficient corps of Draughtsmen and Specification Writers than those employed at present in their extensive offices, and that they are prepared to attend to patent business of all kinds in the quickest time and on the most liberal terms.

PRELIMINARY EXAMINATIONS AT THE PATENT OFFICE.

The service which Messrs. MUNN & CO. render gratuitously upon examining an invention does not extend to a search at the Patent Office, to see if a like invention has been presented there; but is an opinion based upon what knowledge they may acquire of a similar invention from the records in their Home Office. But for a fee of $5, accompanied with a model, or drawing and description, they have a special search made at the United States Patent Office, and a report setting forth the prospects of obtaining a patent, &c., made up and mailed to the inventor, with a pamphlet, giving instructions for further proceedings. These preliminary examinations are made through the Branch Office of Messrs. MUNN &. CO., corner of F and Seventh streets, Washington, by experienced and competent persons. Many thousands of such examinations have been made through this office, and it is a very wise course for every inventor to pursue. Address MUNN & CO., No 37 Park Row, New York.

HOW TO MAKE AN APPLICATION FOR A PATENT.

Every applicant for a patent must furnish a model of his invention if susceptible of one; or, if the invention is a chemical production, he must furnish samples of the ingredients of which his composition consists, for the Patent Office. These should be securely packed, the inventor's name marked on them, and sent, with the Government fees, by express. The express charge should be pre-paid. Small models from a distance can often be sent cheaper by mail. The safest way to remit money is by a draft on New York, payable to the order of Messrs. MUNN & CO. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents; but, if not convenient to do so, there is but little risk in sending bank bills by mail, having the letter registered by the postmaster. Address MUNN & CO., No. 37 Park Row, New York.

Patents are now granted for SEVENTEEN years, and the Government fee required on filing an application for a patent is $15. Other changes in the fees are also made as follows .—

On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Re-issue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing a Disclaimer	$10
On filing application for Design (three and a half years)	$10
On filing application for Design (seven years)	$15
On filing application for Design (fourteen years)	$30

The Patent Laws, enacted by Congress on the 2d of March, 1861 are now in full force, and prove to be of great benefit to all parties who are concerned in new inventions.

The law abolishes discrimination in fees required of foreigners, excepting natives of such countries as discriminate against citizens of the United States—thus allowing Austrian, French, Belgian, English, Russian, Spanish and all other foreigners, except the Canadians, to enjoy all the privileges of our patent system (except in cases of designs) on the above terms. Foreigners cannot secure their inventions by filing a caveat; to citizens only is this privilege accorded.

CAVEATS.

Persons desiring to file a caveat can have the papers prepared in the shortest time by sending a sketch and description of the invention. The Government fee for a caveat is $10. A pamphlet of advice regarding applications for patents and caveats is furnished gratis, on application by mail. Address MUNN & CO., No. 37 Park Row, New York.

REJECTED APPLICATIONS.

Messrs. MUNN & CO. are prepared to undertake the investigation and prosecution of rejected cases, on reasonable terms. The close proximity of their Washington Agency to the Patent Office affords them rare opportunities for the examination and comparison of references, models, drawings, documents, &c. Their success in the prosecution of rejected cases has been very great. The principal portion of their charge is generally left dependent upon the final result.

All persons having rejected cases which they desire to have prosecuted, are invited to correspond with MUNN & CO., on the subject, giving a brief history of the case, inclosing the official letters, &c.

FOREIGN PATTENS.

Messrs. MUNN & CO., are very extensively engaged in the preparation and securing of patents in the various European countries. For the transaction of this business they have offices at Nos. 66 Chancery lane, London; 29 Boulevard St. Martin, Paris; and 26 Rue des Eperonniers, Brussels. They thing they can safely say that THREE-FOURTHS of all the European Patents secured to American citizens are procured through their agency.

Inventors will do well to bear in mind that the English law does not limit the issue of patents to inventors. Any one can take out a patent there.

Circulars of information concerning the proper course to be pursued in obtaining patents in foreign countries through MUNN & CO'S Agency, the requirements of different Government Patent Offices, &c. may be had, gratis, upon application at the principal office, No. 37 Park Row, New York, or any of the branch offices.

SEARCHES OF THE RECORDS.

Having access to all the official records at Washington, pertaining to the sale and transfer of patents, MESSRS. MUNN & CO., are at all times ready to make examinations as to titles, ownership, or assignments of patents. Fees moderate.

INVITATION TO INVENTORS.

Inventors who come to New York should not fail to pay a visit to the extensive offices of MUNN & CO. They will find a large collection of models (several hundred) of various inventions, which will afford them much interest. The whole establishment is one of great interest to inventors, and is undoubtedly the most spacious and best arranged in the world.

MUNN & CO. wish it to be distinctly understood that they do not speculate or traffic in patents, under any circumstances; but that they devote their whole time and energies to the interests of their clients.

COPIES OF PATENT CLAIMS.

MESSRS. MUNN & CO., having access to all the patents granted since the rebuilding of the Patent Office, after the fire of 1836, can furnish the claims of any patent granted since that date, for $1.

THE VALIDITY OF PATENTS.

Persons who are about purchasing patent property, or patentees who are about erecting extensive works for manufacturing under their patents, should have their claims examined carefully by competent attorneys, to see if they are not likely to infringe some existing patent, before making large investments. Written opinions on the validity of patents, after careful examination into the facts, can be had for a reasonable remuneration. The price for such services is always settled upon in advance, after knowing the nature of the invention and being informed of the points on which an opinion is solicited. For further particulars address MUNN & CO., No. 37 Park Row, New York.

EXTENSION OF PATENTS.

Many valuable patents are annually expiring which might readily be extended, and if extended, might prove the source of wealth to their fortunate possessors. Messrs. MUNN & CO. are persuaded that very many patents are suffered to expire without any effort at extension, owing to want of proper information on the part of the patentees, their relatives or assigns, as to the law and the mode of procedure in order to obtain a renewed grant. Some of the most valuable grants now existing are *extended patents*. Patentees, or, if deceased, their heirs, may apply for the extension of patents, but should give ninety days' notice of their intention.

Pateuts may be extended and preliminary advice obtained, by consulting, or writing to, MUNN & CO., No. 37 Park Row, New York.

ASSIGNMENTS OF PATENTS.

The assignment of patents, and agreements between patentees and manufacturers, carefully prepared and placed upon the records at the Patent Office. Address MUNN & CO., at the Scientific American Patent Agency, No. 37 Park Row, New York.

UNCLAIMED MODELS.

Parties sending models to this office on which they decide not to apply for Letters Patent and which they wish preserved, will please to order them returned as early as possible. We cannot engage to retain models more than one year after their receipt, owing to their vast accumulation, and our lack of storage room. Parties, therefore, who wish to preserve their models should order them returned within one year after sending them to us, to insure their obtaining them. In case an application has been made for a patent the model is in deposit at the Patent office, and cannot be withdrawn.

It would require many columns to detail all the ways in which the Inventor or Patentee may be served at our offices. We cordially invite all who have anything to do with patent property or inventions to call at our extensive offices, No. 37 Park Row, New York, where any questions regarding the rights of Patentees, will be cheerfully answered.

Communications and remittances by mail, and models by express (prepaid) should be addressed to MUNN & CO. No. 37 Park Row, New York.

Notes and Queries

F. N. B., of Wis.—Your plan for obtaining power by decomposing water by frictional electricity is met by this fatal objection, the power required to turn the machine would be at least a thousand times greater than the power of the expanding gases resulting from decomposition. Decomposition by electricity is in direct proportion to the quantity of electricity, and the quantity produced by a frictional machine is extremely small, though the intensity is very great. Faraday ascertained by direct experiment that the quantity of frictional electricity required to decompose one grain of water would be that furnished by 800,000 discharges of a battery of Leyden jars, exposing 3,500 square inches of surface charged with thirty turns of a powerful electrical machine.

H. N. B., of Conn.—If you can ascertain the facts in regard to the discovery of antimony in your neighborhood, a statement of them would be very acceptable. Or you might make a readable paragraph in relation to vermiculite, explaining its curious action on the fire. We regret that our space is too limited to permit the publication of your article.

S. J. E., of Ill.—You will find the calculations you require on page 105 of our last volume. We make no charge for them, but if we did it would be nearer $20 than 20 cents.

W. M., of Pa.—Prof. Treadwell's statement is that the pipe of double length will sustain the pressure of double weight of steam from the same boiler; in other words, it will hold twice as much steam of the same density and pressure.

F. F., of Mass.—Steel is burnished, or glossed, as you express it, on fine buff wheels, that is, wheels covered with buckskin or chamois leather and charged with rouge or fine crocus. We know of no method to put a fine blue on steel, except by the use of a sand bath.

T. J. W., of N. H.—Wire rope which is to be exposed to the weather is usually covered with asphaltum.

J. H. A., of Conn.—Gutta-percha is more costly than India-rubber. The solvents are the same for both gums, and rank about in the following order—the best being named first: bisulphide of carbon, chloroform, coal-tar naphtha, camphene, sulphuric ether, petroleum benzine, lamp oil. Lamp oil not being volatile cannot be separated from the solution, and therefore the gum can not be recovered from it. Neither of the gums is completely soluble after being vulcanized, though all of the solvents soften them.

E. G., of Kansas.—Every 33,000 pounds of water per minute falling one foot gives you one horse power. Water weighs 62½ pounds to the cubic foot. To ascertain the power of a stream, therefore, measure the area of the cross section of your stream, multiply this in feet by the velocity in feet per minute, by 62½, and by the fall in feet, then divide the product by 33,000, for the horse-power.

J. P. N., of Pa.—For an answer to your question in regard to the manufacture of paper from wood, see communication on another page. The paper on which the SCIENTIFIC AMERICAN is printed has one-third of its substance of wood. Several processes for preparing the fiber have been patented.

H. L. C., of Cal.—For bichromate of ammonia or other chemicals write to Scheiflin Brothers, of this city.

N. Q. S., of Pa.—The best method of removing earthwork depends upon the kind of earth. If it is hard clay, the plan is to cut into the hill till you have a vertical face of considerable depth, when you cut narrow channels at the base and sides, leaving a lump projecting some three feet, and this is then broken off by means of crowbars at the top. There are machines for excavating loose sand, but they would not be economical in a depth of only twelve feet.

O. H. K., of N. Y.—Enamels are properly glass—silicates of metallic oxides.

E. H. J., of R. I.—In order to prepare gun cotton for photographic uses you will do well to follow the directions given in Divine's Treatise or Fowler's Sunbeam, or any other good work upon the art.

S. G., of Conn.—Marine glue will hold the leather on your pulley. To make it, take four parts India-rubber, dissolve this in thirty-four parts coal-tar naphtha, warm, shaking it at the same time. Add to this sixty-four parts powdered shellac, which must be heated in the mixture until all are dissolved. When hot pour it all out on an iron plate in sheets, like leather. When wanted melt it in a pot like any other glue. Hilton's Insoluble Cement will also hold leather on iron, and will stand cold water but not hot. It is better to put three or four rivets in the wheel to help the cement. Leather can be fitted to valve seats by dove-tailing the seat, making the leather the width of the dovetail at the bottom, and crowding it in.

C. B., of Md.—At the great trial in Philadelphia Stevenson's turbine yielded 91 per cent of the power; this, so far as we know, is much more than has ever been yielded by an overshot wheel. Mr. Stevenson's address is, J. E. Stevenson, No. 200 Broadway, New York. You will find illustrations of his and several other turbines in back numbers of the SCIENTIFIC AMERICAN, all of which are claimed by their owners to be the best in the market. Turbines are not stopped by back water.

H. B. S., of Ohio.—In some States it is necessary for a man to have a license to sell any thing. He must conform to the State laws in regard to vending.

E. H. S., of Pa.—That petroleum is of vegetable origin is not doubted, but the mode of its formation is mysterious. There is no reason to suppose that the deposits are influenced in any way by the thickness of coal beds in their vicinity. The coal field west of the Mississippi lies between the parallels 34° and 45° north latitude, and 14° and 20° west longitude from Washington.

W. B., of Mo.—You will find many articles on silver-plating in back numbers of this paper.

Money Received

At the Scientific American Office, on account of Patent Office business, from Wednesday, January 11, to Wednesday, January 18, 1865:—

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To cover a Dome by the second Method.
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To describe a Pattern for a Tapering Square Article.
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PROPOSALS FOR ICE.

MEDICAL PURVEYOR'S OFFICE, WASHINGTON, D. C.

Sealed Proposals will be received at this Office until January 25, 1865, for furnishing ICE to the Medical Department of the Army, at the points herein designated. The Ice to be stored by the contractor in properly-constructed ice houses at each point of delivery, on or before the 15th of April next; the ice not to be receipted for until its quality, the fitness of the ice-house, and the manner in which it is packed shall have been approved by a medical officer, and payment will be made only for the amount thus actually stored and receipted for.

The proposals will be made for the quantities indicated below as required at the respective places, with the proviso that should more be needed at any time for the year's supply, it shall be furnished at the same rates and under the same conditions.

QUANTITY TO BE DELIVERED AT

Annapolis, Md., ice-house, owned by the United States.....150 tuns.
Point Lookout, Md., ice-house owned by the United States.200 tuns.
Fortress Monroe, Va., ice-house owned by the United States.280 tuns.
Portsmouth, Va., ice-house not owned by the United States.100 tuns.
Newbern, N. C., ice-house not owned by the United States..400 tuns.
Hilton Head, S. C., ice-house owned by the United States...450 tuns.
Beaufort, S. C., ice-house owned by the United States.....300 tuns.
Savannah, Ga., ice-house not owned by the United States..400 tuns.
Pensacola, Fla., ice-house not owned by the United States..100 tuns.
Mobile Bay, Ala., ice-house not owned by the United States.100 tuns.
New Orleans, La., ice-house owned by the United States....500 tuns.

Proposals will also be received for furnishing Ice, daily by weight, for the year 1865—in such quantities as may be required by the Surgeons in charge—at United States General Hospitals, at the places enumerated above, and upon the following annual estimate, in and near:—

Boston, Mass..... 10 tuns.
Portsmouth Grove, R. I..... 130 tuns.
New Haven, Conn..... 60 tuns.
New York..... 800 tuns.
Newark, N. J..... 100 tuns.
Philadelphia, Pa.....1,300 tuns.
Baltimore, Md..... 200 tuns.
Frederick, Md..... 75 tuns.
Washington, D. C.....2,500 tuns.

All additional amounts that may be required at these places until January 1, 1866, are to be furnished at the same rates.

FORM OF PROPOSAL.

The undersigned proposes to furnish —— tuns of first quality Ice, carefully packed in substantial ice-houses, at the within-named points, namely: ——, ——, ——, ——, at the following price per tun of two thousand pounds, namely: at ——, ——, ——, ——, tuns, at $—— per tun.

The Ice to be subject to the inspection, measurement and approval of a Medical Officer, or other properly-appointed inspector, before being receipted for.

Payment to be made from time to time upon duplicate bills certified to by the Medical Director.

(Signed) ——.
——.

FORM OF PROPOSAL.

The undersigned proposes to furnish daily, or otherwise, all the Ice required for the hospitals, upon approved requisitions of Surgeons in charge, at or near the within-named points, at the following price per hundred pounds, namely: —— —— —— —— $—— cents per hundred pounds.

The Ice shall be of the best quality, and subject to the approval of the Surgeon in charge, who shall receipt for the actual amount delivered at each hospital.

Payment to be made from time to time upon duplicate bills, certified to by the Medical Director.

(Signed) ——.
——.

The above form of proposals will be adhered to as closely as practicable. Other forms will be received by the Department and duly considered.

A proper guarantee that the bidder is able to fulfil the contract, certified to by the Clerk of the nearest District Court, or a United States District Attorney, must accompany the proposal, or it will be rejected.

An oath of allegiance to the United States Government must also accompany the proposal.

The contracts will be awarded to the lowest responsible party or parties, who will be duly notified by mail or otherwise that their bid is accepted, and immediately required to enter into contract under bonds to the amount of $5,000. The bonds must be properly certified, and the post-office address of principals and sureties stated upon them.

Bidders may be present in person when the proposals are opened.

The post-office address of the parties proposing must be distinctly written upon the proposal.

Proposals must be addressed to "Surgeon Charles Sutherland, U. S. Army, Medical Purveyor, Washington, D. C."

The Department reserves the right to reject any and all bids deemed unsuitable.

CHARLES SUTHERLAND,
Surgeon U. S. A. and Medical Purveyor,
Washington, D. C.

Printed forms of proposal may be had at this office. 3 3

COMSTOCK'S ROTARY SPADER.—HAVING DISposed of the right to manufacture and vend Comstock's Rotary Spader throughout the United States, except the New England and other Atlantic and Pacific States, we are now prepared to issue licenses to manufacture and vend this implement upon the basis of a license fee of ten per cent of gross sales of machines made and sold to parties who will advance in cash the following sums, to be reimbursed from said per centage:—For the New England States, $5,000; for the State of New York, $6,000; for the State of New Jersey, $3,000; for the State of Maryland, $2,000; for the State of Delaware, $1,000; for the State of California, $10,000; for the State of Oregon, $3,000; or, for the whole to one party, $25,000.

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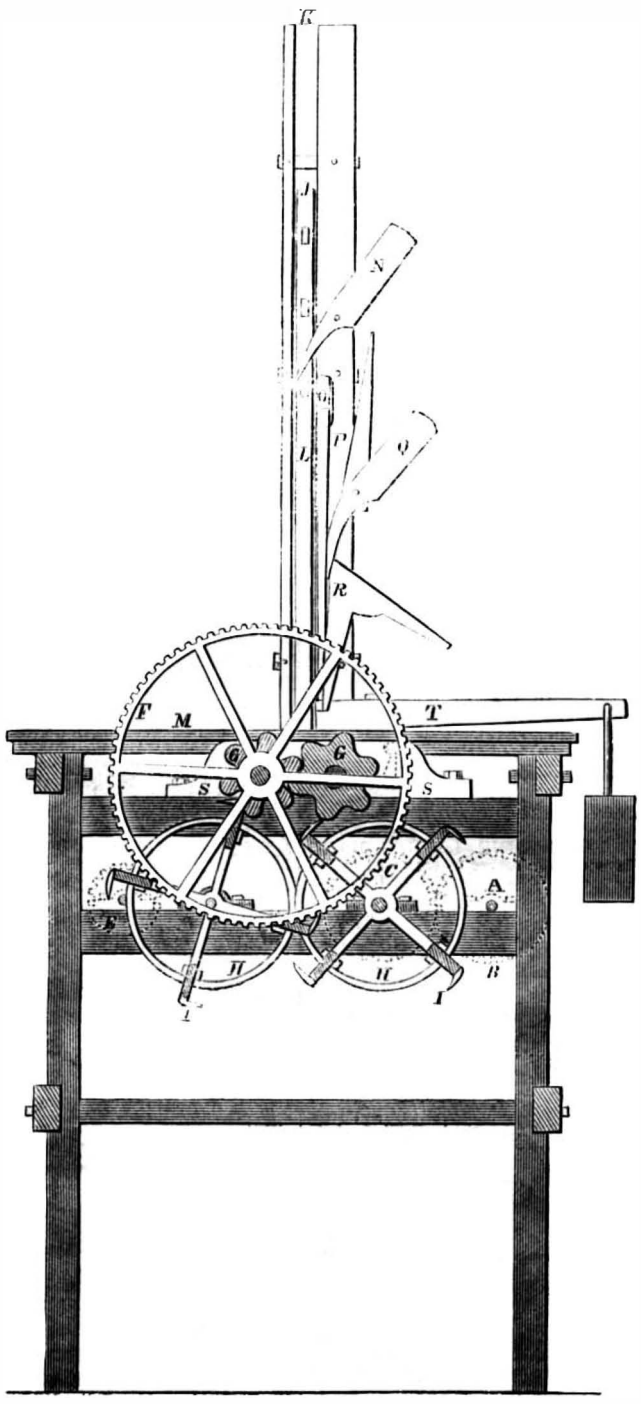
This machine is intended to facilitate dressing hemp and flax, and is thus described by the inventor. As the manufacture of linen goods is rapidly increasing in this country, anything tending to facilitate the preparation of the material will be a valuable acquisition. The description will render the details intelligible to all:



HOWARD'S HEMP AND FLAX DRESSER.

A is a shaft to which the power is applied through two pulleys, and a gear, B, shown by a dotted circle on the frame. C is a corresponding gear attached to the end of the shaft of the dresser; it is also shown by a dotted circle. E is a cog-wheel, on the shaft of which is a friction clutch; the wheel is geared into the large wheel, F. G G are two fluted rollers, and H H are dressers made with floats, armed with hatchel teeth, I, on the edges. There is a clamp, not shown, in which the hemp is placed and laid in the top of the frame at K, resting upon the upper catch, J, on the rack, L. From thence it is drawn down to the table, M. The hemp passing between the fluted rollers is crushed and broken, and in passing down between the dressers is dressed also. The rotary motion of the rollers is then reversed by the operator with the lever attached to the friction clutch, before mentioned, carrying the clamp up to the dog, N, passing it over the top of the vibrating board, O, into the groove, P, and pressing the board to the opposite side of the rack, L. The buts of the hemp fall directly between the rollers. Their motion being again reversed, the flax is drawn down and dressed. Another reverse of the rollers carries the clamp up to the dog, Q, and throws it out over the frame R. S is a cast iron housing containing one movable box. T T is a lever and weight used to give the desired pressure upon the movable box. This invention was patented through the Scientific American Patent Agency by C. G. Howard, of Topeka, Kansas, on Sept. 6th, 1864, and assigned to C. G. Howard and E. A. Goodell. For further information address them as above.

Patent Laws in England.

The subject of protection for inventions, in the shape of patents, has been much discussed in England lately, and divers opinions have been given as to the expediency of so encouraging inventors. A royal commission, appointed by authority, have recently deliberated upon the subject in question, and have arrived at the following conclusions:—"1. That the present system of obtaining and paying for letters patent ought to be maintained, but that patent fees should not be made to contribute to the general expenditure of the State until every reasonable requirement of the Patent Office had been satisfied. 2. That the patent be granted if it be found after examination that there has been no previous documental publication of the invention; but that no investigation be entered into concerning its merits. 3. That one of the judges should sit for the trial of patent cases exclusively; that he should be aided by scientific assessors; should sit without a jury unless the parties to the suit or action desire a jury, and, when sitting without a jury, that he should decide questions of fact as well as law. 4. that the granting of licences to use patented inventions ought not to be made compulsory. 5. That patents ought not to be granted to importers of foreign inventions. 6. That no patent should be extended beyond the original term of fourteen years. 7. That the Crown should be empowered to use patented inventions without having obtained the consent of the patentees, and should pay him for such use a sum to be fixed by the Treasury.

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PATENT LAW DECISIONS AND DISCUSSIONS

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